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# Agriculture in a World of Change

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## Proceedings of Outlook '91

*67th Annual Outlook Conference*  
**U.S. Department of Agriculture Washington, D.C.**  
**November 27-29, 1990**





# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture

Washington, D.C. 20250-3900



## PREFACE

These pages contain speeches presented during "Agriculture in a World of Change," the U.S. Department of Agriculture's 67th Annual Outlook Conference. Included are all papers submitted by those participating in the program and transcriptions of several speeches and panel discussions.

The Conference took place at USDA headquarters in Washington, D.C., November 27-29, 1990, with about 1,000 people in attendance. Some 70 speakers and panelists representing U.S. and foreign governments, agribusiness, and agriculture participated in 25 sessions.

This book is divided into two sections. The first presents the outlook for the farm economy and major commodities, rural America, food and nutrition, and other related topics. The second includes presentations by a number of distinguished speakers during plenary sessions related to this year's theme of agriculture and world changes. Topics discussed included the new farm bill, trade negotiations, the profound changes taking place in the international arena, food safety and environmental issues, and energy issues for agriculture.

To purchase additional copies of this publication, call 1-800-999-6779 or write ERS-NASS, P.O. Box 1608, Rockville, Maryland 20850. A separate publication presenting charts used by speakers at the Conference, Outlook '91 Charts, as well as audio cassette tapes of all Conference sessions, are also available. Information about these materials and other publications of interest can be found at the back of this book.

Recipients of this Proceedings will be sent preliminary information on next year's Conference, Outlook '92, which has been tentatively scheduled for December 3-5, 1991.

For further information contact Raymond Bridge at (202) 447-5447.

*James R. Donald*

JAMES R. DONALD

Chairperson

Outlook Conference Steering Committee

World Agricultural Outlook Board  
Room 5143 South Building, USDA  
Washington, D.C. 20250-3800

March 1991

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## TUESDAY, NOVEMBER 27

	<b>Jefferson Auditorium</b>	<b>Cafeteria Meeting Rm.</b>	<b>107 Administration</b>
8:30	C1 Rural Development and Credit Outlook	C2 Dietary Guidelines and New Food Surveys	C3 Impact of Soviet Transportation System on U.S. Farm Exports
10:00	<b>Break</b>		
	<b>Jefferson Auditorium</b>		
10:30	P1 Keynote Session: Agriculture in a World of Change		
12:15	<b>Lunch</b>		
1:30	P2 Overview of the 1991 Outlook		
3:00	<b>Break</b>		
3:20	P3 Panel: Trade and Economic Prospects in a Crucible of change		
5:00	<b>Adjourn</b>		
5:15	<b>Reception, Administration Building Patio</b>		

## WEDNESDAY, NOVEMBER 28

	<b>Jefferson Auditorium</b>	<b>Cafeteria Meeting Rm.</b>	<b>107 Admin.</b>	<b>3501 South</b>	<b>Auditors Building</b>
8:30	C4 Food Grains	C5 Dairy	C6 Cotton	C7 Family Economics	C8 Aquaculture
10:00	<b>Break</b>				
10:30	C9 Feed Grains		C10 Fruit and Vegetables	C11 Tobacco	C12 Forest Products
noon	<b>Lunch</b>	<b>(Cotton Luncheon)</b>			
1:30	C13 Oilseeds		C14 Food Prices and Food Labeling	C15 Floriculture and Horticulture	C16 Farm Income and Inputs
3:00	<b>Break</b>				
3:15	C17 Livestock and Poultry	C18 Sweeteners	C19 Technology and Regulation of Pesticides and Fertilizers		C20 New Crops and New Products
5:00	<b>Adjourn</b>				
6:30	<b>Sweeteners Dinner</b>				

## THURSDAY, NOVEMBER 29

	<b>Jefferson Auditorium</b>
8:30	P4 Food Safety and Environmental Dilemmas: Search for Solutions
10:15	<b>Break</b>
10:45	P5 Energy Issues for Agriculture
12:15	Concluding Remarks
12:30	<b>Adjourn</b>



# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

United States Department of Agriculture  
Washington, D.C. 20250-3900



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Outlook '91, Session #C1 For Release: Tuesday, November 27, 1990

## **BUILDING A BETTER RURAL POLICY: THE PRESIDENT'S RURAL DEVELOPMENT INITIATIVE**

WALTER E. HILL  
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U.S. Department of Agriculture

### **INTRODUCTION**

In January, 1990, President Bush announced the steps his Administration would take to strengthen the delivery of Federal support for rural development. Those steps were intended to achieve two principal goals:

- To improve coordination among Federal agencies and lead to active cooperation with the States, localities, and private sector;
- To improve the effectiveness of the Federal Government's rural efforts by adopting a strategic and comprehensive approach to rural development.

The President's Initiatives called for six major actions:

- Creating a President's Council on Rural America to advise the President and the Administration on issues concerning rural America;
- Establishing the Economic Policy Council's Working Group on Rural Development (EPC-WGRD), with the Secretary of Agriculture as chair, as a permanent, inter-departmental body to coordinate rural development activities within the Federal Government;
- Forming State-level rural development councils to coordinate rural development efforts among Federal departments and agencies and to establish effective collaboration with States, local governments, and the private sector;

- Improving the targeting of Federal program and other resources to enhance program effectiveness and conserve increasingly scarce Federal resources;
- Conducting demonstrations of effective programs and practices; and
- Improving rural policymakers' access to information by strengthening the Rural Information Center.

In the sections that follow, I will describe the principles that underlie the Presidential Initiative and guide its implementation, and will provide an update on the status of the Initiative and related developments.

#### WHY WAS THE INITIATIVE UNDERTAKEN NOW?

The President's Initiative responds to the opportunity to take effective action that exists at the present time. It has now become clear that the economic difficulties experienced by rural America over the course of the last decade reflect not so much a temporary downturn in fortunes as the result of a basic shift in the comparative economic advantage of rural areas. Rural America has always been handicapped in achieving economic progress by its low density and small scale conditions that limit the ability of its businesses to compete in outside markets and make the services of its governments more costly and less effective.

Basic changes in the world economy have added to rural America's economic challenges. The ability of rural America's natural resource base to provide gainful employment is continuing to decline. In 1969, nearly one in five rural workers was directly employed in farming, forestry, or mining; today the figure is closer to one in ten. This fact reflects improvements in productivity in those industries, which have enabled us to enjoy the products of America's resource industry at ever-lower prices. At the same time, changes have occurred in the nature of the goods provided in our economy. Increasingly, services make up a much larger part of what we buy in the marketplace, leading to a relative decline in demand for rural America's traditional products. These are not changes that we could lightly undo. Our social progress rests on our ability to expand the range of goods and services our dollars buy, and a return to former days would mean a step backward for American society as a whole.

Adding to these challenges are another set imposed by the globalization of economic activity. The time was when rural America's products were sought out by an American market eager to take advantage of the high quality, low-priced goods that rural workers provided. But with the rising industrial capability of Third World nations in the Pacific Rim and elsewhere, rural

workers find they can no longer maintain their living standard while competing against the low wages paid by manufacturers in those nations. Increasingly over the decade of the eighties, rural manufacturing was hard-pressed by its new competition, and many rural jobs were lost to foreign workers or were replaced by automated equipment that could do the job even more cheaply.

Increasingly, the policymaking community has come to realize the fact that while rural America's heritage flows from its farming tradition, the future ability of rural Americans to maintain a livelihood will be more affected by the actions we take to improve the competitive position of rural America's non-farm industries. It is these industries that provide the vast majority of rural jobs, in many cases enabling farm families to stay on the land, and it is here that the most viable options for meaningful development exist.

At the same time, these conditions represent a challenge to rural America and an opportunity for the Nation's policymakers to respond in constructive new ways to the opportunity they represent. In announcing his Initiative, President Bush signaled his readiness to take up this challenge and respond to the need for rural America to adapt creatively to these changed circumstances.

#### WHY WAS AN INITIATIVE NEEDED?

As the opportunity for policy intervention on behalf of rural America became clearer, the inappropriateness of our mix of programs has also come into sharper relief. The President's Initiative is designed to overcome several obstacles to effective Federal responses to rural needs. Those obstacles are of several types.

- Federal rural policy is fragmented. Each department and agency runs its programs independently from the others, with few attempts to cooperate in addressing rural problems.
- Federal rural policy is not comprehensive. Nowhere is there a means to take an overall perspective on rural problems and assure that some rural needs do not fall into the cracks between agencies and programs. Although rural problems are complex and many-sided, approaches that address the full range of rural needs are currently impossible to achieve.
- Federal programs are inflexible. While conditions differ greatly from one region to another, Federal programs often cannot be modified to match local needs.



- Federal program responses fail to incorporate strategic vision. While rural problems are mostly long-term, most programs offer only short-term solutions. Few attempt to address fundamental development needs of rural communities, instead focusing on meeting isolated local wants that may contribute little to achieving more basic community goals.
- Federal responses fail to involve other participants in rural development. In the last decade, the mantle of responsibility for rural development has passed from the Federal Government to the States, many of whom have devised statewide rural plans and created new organizations to implement them. Likewise, local governments, businesses, and the non-profit sector have all taken important roles in promoting rural development. But Federal programs often continue to be operated independently of these initiatives.

### **A NEW VISION FOR RURAL AMERICA**

We can do better. But we will only succeed if we reorient the Federal Government's rural development policy around new principles that reflect the current reality in rural America. The President's Initiatives are guided by four main principles.

#### **Central Role for the Private Sector**

Ultimately, rural development cannot occur unless the ability of the private economy's productivity and ability to compete in world markets are enhanced. The most pressing need in rural areas today is for continued growth in both employment and incomes. Rural workers are more likely to be unemployed or underemployed than workers in the urban economy. Recent history has shown them to be the first laid off in a recession and the last rehired during a recovery. In the last decade, the ability of the rural economy to deliver income growth has not kept pace with national trends. If rural people are to be able to live in their home towns, the businesses that supply their livelihoods must be able to sell more products, commanding a higher price in competitive world markets. The only alternative--to subsidize rural life--is a luxury that, as a Nation, we can no longer afford.

#### **The Benefits of Development Must Be Shared**

Deep economic disparities exist within rural America. While some areas enjoy average incomes that compare favorably with those in America's cities, others experience poverty rates of 50 percent or higher. While some rural communities achieved greater prosperity during the eighties, others faced economic hardships

that widened the gap between them and the American dream. America is a Nation, not a collection of independent localities. Americans believe in the right of all their citizens to an equal opportunity to experience economic and social progress. While assistance is merited in many parts of rural America, it is most urgently needed in those places, and among those social groups, who are farthest from achieving that progress.

### **New Partnerships are Needed**

While Federal departments and agencies operate many programs that can play critical roles in building a brighter rural future, the lead responsibility for rural development now lies with State governments. In addition, local governments have major responsibility for their own development. And in many areas, private businesses and non-profit organizations have taken important steps to promoting rural development. To make Federal programs effective, they must be operated in collaboration with these efforts, not in competition. Finding a means to bring all these groups together in a meaningful way will not be easy, but it is essential.

### **A Strategic Approach is Needed**

A multiplicity of factors make up rural economies and societies and produce the maladies they face. Not only does this make them difficult to diagnose, it means that no simple prescription can do more than treat superficial symptoms. Rural conditions took a long time to develop, and they will take a long time to resolve. They involve a wide range of dimensions--industrial, resource base, educational, social, cultural, health, and attitudinal, among others; solutions must address all of these dimensions, or risk failure. They may differ considerably from one place to another; responses must be flexible enough to respond to this diversity. To ultimately be successful, rural development must be accomplished by a goals-oriented process, one that combines specific programmatic initiatives in a strategic manner. The current limits on America's financial resources demand such an approach.

### **HOW THE PRESIDENT'S INITIATIVES WILL HELP**

The President's Initiatives are designed to adhere to these principles. First, the creation of the Economic Policy Council's Working Group on Rural Development establishes, on a permanent basis, a cabinet-level, interdepartmental policymaking body with the authority to consider both interagency and intergovernmental barriers to developing the new partnerships that are needed. Second, the State Rural Development Councils are established as permanent interdepartmental bodies to promote effective collaboration among themselves, and with States, local

governments, and the private sector at the State level, a level where effective rural development actions can occur.

Both steps bring a wide range of agencies, representing virtually the full scope of rural development concerns, to the table, making a comprehensive approach to rural development more possible than ever before. Both the EPC-WGRD and the State Councils have been instructed to take a comprehensive perspective on rural problems; to look beyond individual Federal and State programs to identify, and address, major rural development opportunities; to treat rural development as a long term issue and build strategies that focus not on next year, but the next 10 years. Through the State Councils, the Initiative calls for a hard look at the way Federal rural development resources are targeted, both among areas of the Nation, and among the social groups that comprise it. While short-term actions may be needed to resolve social problems, the focus is clearly placed on strengthening the capacity of the private economy to provide sufficient economic returns to rural citizens so that the need for public programs can be minimized in the long term.

#### **STATUS OF THE PRESIDENT'S INITIATIVES**

In the last 10 months, much progress has been achieved in developing a framework for achieving the goals set forth in the President's Initiative.

- The President's Council on Rural America has been formed and will hold its first meeting after the first of the year. Once in full operation, it will provide essential advice to the President and the EPC-WGRD on both policy options and implementation issues, and will be especially helpful in making the private sector an active participant in rural development.
- State Rural Development Councils have been formed in eight States--Kansas, Maine, Mississippi, Oregon, South Carolina, South Dakota, Texas, and Washington. A Rural Economic Development Institute to provide initial training to "kick start" the councils has been created and tested. By mid-1991, these lead councils will be fully trained and operational. Based on the experiences of these initial Councils, others will be formed beginning in late 1991.
- Both the initiative to improve Federal program targeting, and to demonstrate effective rural development strategies, will be implemented through the State Councils. Specific projects will be undertaken by the leading State Councils as a part of their strategy implementation, scheduled to begin in 1991.



- The Rural Information Center (RIC), part of the National Agricultural Library (NAL), has been operating for two years. Since January, its staff and range of duties have been greatly expanded through cooperative arrangements between NAL and the Department of Health and Human Services, the Small Business Administration, and the Forest Service. Other Federal agencies are considering cooperative activities with the RIC as well.

The recent passage of the 1990 Farm Bill, which contained a rural development title, has added new components which will be implemented in conjunction with the President's Initiative. Among other things, the bill does the following:

- Creates a new Rural Development Administration (RDA), comprised of elements of several agencies within USDA, under the supervision of the Under Secretary for Small Community and Rural Development. The Secretary of Agriculture has broad discretion in assigning specific agencies to the RDA.
- Provides new authority in several program areas, including water and sewer programs, telecommunications, small business development, programs for natural resource-impacted communities, capital formation, and a renewal for authority for section 111 planning.

### CONCLUSION

This initiative represents a major departure from past approaches to rural development in the United States. It will bring about a new way of doing business in the area of rural development. It promises to create, for the first time, a coordinated Federal response to a major policy issue. And by reaching out to the States, it promises to create a "new alliance" between the Federal Government and the States, a measure the Nation's governors called for in their 1988 report on rural development.<sup>1</sup>

The organizational challenges we face in taking on these tasks are gigantic. Federal departments and agencies are not natural allies, responding as they do to different clientele groups, different congressional committees, and independent leadership. Nor are States and local governments well disposed by tradition to partnership with their "big brother" in Washington. Few who make policy are comfortable thinking about problems in a 10- or 20-year strategic framework, when the state of affairs 12 months into the future is so uncertain. But these are the tasks that

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<sup>1</sup>National Governors' Association, New Alliances, . . . 1988.

must be tackled if we are to succeed at bringing rural America into step with the rest of the American economy. We have our challenge. Let us get on with the job.



**ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**  
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Outlook '91, Session C1 For Release: Tuesday, November 27, 1990

THE CREDIT OUTLOOK AT FmHA

La Verne Ausman  
Administrator, Farmers Home Administration

Good morning. Agriculture in a world of change is certainly appropriate as the theme for this conference, because agriculture is capital intensive and the availability of capital is always a concern. Change is also what is happening at the Farmers Home Administration. FmHA is returning to its original mission as a lender of last resort of supervised credit in moderate amounts to farmers who have a reasonable chance for success.

The outlook for credit is good. It looks good across the board for agriculture generally, and it looks good for our FmHA borrowers in particular.

Before I talk about that in more detail, let's take a quick look at how we got to where we are today.

As you know, for most of its history, FmHA and its predecessor agencies played a rather modest role in farm credit. That's the way it was supposed to be -- a lender of last resort for the relatively small number of farmers who worked hard, were good managers, but were unable to finance their operations at commercial rates and terms. They were usually beginning farmers or victims of disaster.

Well, we all know what happened in the late seventies and eighties as many farmers found their regular lenders no longer could stay with them. FmHA was the only game in town for many.

FmHA's traditional 3-to-5 percent share of the nation's farm credit began rising, topping out only in 1987 when it passed 16 percent. Operating loans from FmHA that year accounted for almost one-quarter of the U.S. total -- a fraction under 23 percent.

A series of droughts of national proportions and a wide-open disaster emergency loan program played a role. During the years 1978-1984, FmHA booked \$17.5 billion in emergency loans, and \$6.5 billion is still outstanding. A new economic emergency program, basically a refinancing mechanism, brought \$7.23 billion in new lending in that same period -- \$2.6 billion of that is still out. A total of \$5.4 billion in both programs is delinquent.

The 1990 farm bill, by the way, wipes the economic emergency program off the books, but not the debt. The program actually expired in 1984.

Obviously, all of this led to some serious thought about where FmHA was heading, about how to return it to its proper role and yet not abandon creditworthy farmers who were having trouble obtaining credit.

Against this background and as a matter of good business practice, sound governmental policy, and budgetary realities, FmHA turned to guaranteed loans.

We had a way to go. In 1982, guarantees accounted for about 1 percent of all FmHA farm lending. They doubled to 2 percent the next year, and then began a dramatic increase until they passed the 50-percent mark in 1987 -- another FmHA first of that year -- and have remained above the 50-percent level since.

In the last fiscal year, guarantees accounted for 81 percent of our farm ownership loans and for 55 percent of operating loans -- for 61 percent of our total farm lending.

It is safe to say that, so far as we at FmHA are concerned, guarantees are here to stay.

The 1985 farm bill reflected Congressional agreement with this direction by initiating a formal transition that is still under way. In the 1990 fiscal year recently ended, we made our first loans under new authority for guaranteed water and sewer and other community facility loans.

Congress reaffirmed that agreement in the 1990 farm bill and the 1991 fiscal year budget reconciliation and appropriations bills.

For this fiscal year, Congress appropriated altogether \$3.7 billion in guaranteed loans for FmHA. It breaks down into \$3.35 billion for farm programs, \$230 million for community and business loans, and \$100 million for a pilot program of guaranteed rural housing loans.

As a result of reconciliation to meet budget targets, some direct lending was shifted to guarantees, giving us a total of \$4.2 billion for guaranteed farm ownership and operating loans for this year, almost double the \$2.2 billion for all the farm loans we made last year.

Here is a look at actual loan levels for fiscal years 1989 and 1990 and the budget figures for this year, with guarantees as a percentage of total loans:

#### Farm Operating Loans

Year	Total	Direct	Guaranteed	G.% of total
1989	\$1.7B	\$856M	\$879M (loans made)	50
1990	1.6B	733M	908M	55
1991	3.35B	493M	2.9B (budgeted)	85

#### Farm Ownership Loans

1989	394M	95M	299M (loans made)	76
1990	417M	80M	337M	81
1991	841M	57M	783M (budgeted)	93

Two trends are clear in this. One is the increasing share of total lending that is going to guarantees. The other is the general decline in overall loans. Other lenders are having the same experience as farmers simply borrow less than a few years ago. Demand is down. Last year's credit level nationwide was the lowest since 1983.

As you can see, the outlook at FmHA is good, indeed.

Adding to that outlook, and the aspect of change that I mentioned, is another provision in the 1990 farm bill that provides interest assistance on a guaranteed loan of up to four percentage points.

The old interest buy-down program under which we matched a lender's reduction in interest by up to two percentage points was amended so that now we cover all the costs.

With the reductions in direct loans brought about by budget reconciliation, this will be helpful in assuring adequate credit generally and, especially, for our direct-loan borrowers who are succeeding and need only this amount of assistance to graduate to commercial credit.

Also on the list of change -- and also from the 1990 farm bill -- is authority for Farmer Mac to pool our guaranteed loans for sale on the secondary market. Sale of the guaranteed portion of the loan helps the lender's capital reserve position, improves its liquidity, and strengthens its overall lending ability.

Working with Farmer Mac, we would like to see this in operation as early in 1991 as we can make it happen.

We have some other changes in the works that will not be evident to everyone. By that I mean changes in computer software and hardware that will help speed up loan-making and servicing, and management changes designed to bring more consistency and efficiency to many of the things we do everyday.

All in all, we at FmHA really will be working in a world of change.

Thank you.



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91, Session C1

Tuesday, November 27, 1990

## Outlook for Farm Credit

Peter C. Myers  
President, Farm Credit Council

Very briefly, I'd like to comment on the ABA's recent broadside at the Farm Credit System, which was released at their Denver conference without a chance for us to respond. A more detailed rebuttal is in the press packet.

I think the Nov. 19 issue of Food and Fiber summed it up pretty well: It said the ABA's accusation that Farm Credit was the major cause of the 1980s farm recession was both "bizarre" and "ludicrous." We believe the ABA study is riddled with factual errors and self-serving conclusions.

I will mention only a couple of the major errors of fact:

\* The central thesis of the ABA study is that a 1971 law allowing the Farm Credit System to loan up to 85% of market value of farmland collateral touched off a "lending frenzy" that boosted land values. But look at the facts: Independent data from the Farm Credit Administration show that from 1975 to 1981, loan-to-appraised value ratios on new Federal Land Bank loans actually dropped, from 58 percent to 55 percent. The foundation of the ABA study does not hold up.

By the way, the Farm Credit System has much tighter controls on maximum loan-to-appraised value limits than do commercial banks; the Comptroller of the Currency currently sets no limits on loan-to-AV ratios for commercial banks.

\* The ABA blames loose lending practices by Farm Credit for creating a "speculative bubble" that burst in 1980, which collapsed land values. But that's not what USDA's Economic Research Service said, in an Agricultural Outlook report issued just this month. ERS looked in depth at the issue of farmland prices during that period, and concluded there was no evidence of a speculative bubble in the run-up of farmland prices. Because of various factors, ERS said -- and I quote -- "finding a single source for the runup is unlikely."

\* The ABA accuses Farm Credit of being responsible for virtually all the recent costs of USDA's price support programs and the losses at the Farmers Home Administration, and picks a pricetag of \$100 billion out of the air. Does anyone seriously believe this?

The handouts go into greater detail, but I will stop here. Frankly, the ABA study is not worthy of much of a response. There are far more important issues we should be talking about: Specifically, the outlook for rural development and agricultural credit.

### 1990 AG CREDIT OUTLOOK

#### A) General Condition of the Farm Credit System.

Although the Farm Credit System has not fully recovered from the farm depression of the 1980s, we continue to show substantial improvement, especially in our core earnings.

For the nine months through Sept. 30, we posted net earnings of \$445 million (down from \$514 million as of the same time last year), and net interest income of \$904 million (up from \$732 million a year ago). Total combined net income was \$93 million, reduced from last year's level of \$158 million largely by the extraordinary loss related to repurchase of debt at the Spokane District Bank.

But the level of core earnings by the System, as represented by the excess of net interest income over other net other expenses, continued to improve. While this obviously reflects the general improvement of America's farmers and ranchers since the 1980s, it also reflects decreasing operating costs and new efficiencies within the Farm Credit System as well. Our third-quarter financial information should be in your press packet.

Total assistance provided by the Farm Credit System Financial Assistance Corporation is not expected to exceed the current level of about \$1.3 billion, and all banks are making plans to pay back all the bonds plus all the interest at the proper time. Also, System banks have set aside funds in reserve to capitalize the FCS Insurance Fund as soon as regulations are published by the Insurance Board.

#### B) Challenges Facing the Farm Credit System.

We note several trends that will affect American agriculture and the supply of credit to finance its operations:

\* The 1990 Farm Bill. Individual Farm Credit lending institutions are analyzing how the Farm Bill reductions may affect their borrowers, based on their local commodity and borrower situations. Clearly, the loss of government program funding is of concern to most farmers and ranchers and their lenders. However, no overall conclusion can be reached now due to several unknown factors, such as the future of a stalling national economy; the



success of the new "flexibility" in farm programs; the probable lack of program regulations until next March or April; and larger factors such as price hikes in oil and related products, resolution of the political crisis in the Middle East, world trade and commodity prices.

\* General Agreement on Tariffs and Trade (GATT). A collapse of the GATT negotiations, accompanied by world trade wars, could have a far greater impact on American farmers than the 1990 Farm Bill enacted by Congress. Its effects continue to be unknown but of tremendous significance for all lenders.

\* New or Tighter Regulations. As FCS officials have testified before Congress, "lender liability" provisions of the federal CERCLA (or Superfund) law present a serious risk to continued rural development. Turning lenders into environmental policemen may save the government some money, but it is causing the loss of credit to many otherwise credit-worthy rural borrowers.

Farmers and ranchers also will be affected by new environmental provisions in the 1990 Farm Bill, such as the Swampbuster and Sodbuster provisions. Lending institutions will be watching with concern as USDA drafts the rules and regulations to implement the law.

Also, attempts by environmental groups to sharply increase federal grazing fees on public lands could have an obviously detrimental effect on the financial condition of many ranchers. Congress narrowly defeated such an increase this year.

\* Government-sponsored enterprises. Renewed attempts by the U.S. Treasury Department to become the "super-regulator" of all GSEs could have a major impact on the future of agricultural credit in general and the Farm Credit System in particular. To date, Treasury has failed to focus on the fact the System is the only GSE in the United States with an arms-length, independent federal regulator (the Farm Credit Administration), minimum capital requirements and a self-financed insurance fund. The key part of the Treasury Department's agenda -- imposing AAA credit ratings on all GSEs, absent government backing -- could force a drastic cut in the availability and a sharp increase in the cost of all agricultural credit within the United States.

\* Demographic changes. A changing rural population and economy is likely to have significant effects on agricultural and rural lenders. USDA statistics show that fully 40 percent of agricultural landowners in the United States are 60 years or older, suggesting that a significant amount of American farmland will be changing hands, or at least operators, in the relatively near future. Other potentially significant factors affecting the need for credit are that 40 percent of all agricultural landowners are women, and that off-farm income accounted for 57 percent of the net cash income to farm operators and their families (as of 1988).

### C) Opportunities for the Farm Credit System.

\* The 1990 Farm Bill authorized FCS Banks for Cooperatives, CoBank and Rural Electric Cooperatives to finance water and sewer system in small towns and rural areas, which should help restore and expand the infrastructure needed for rural development.

\* In addition, the sharp reduction of Farmers Home Administration direct loans, and the corresponding shift to guaranteed loans, should expand the need for System financing in rural areas.

\* Concerning Government-sponsored enterprises, the Treasury Department's stated goal of improving the financial strength of the nation's GSEs may result in the System being required to diversify its lending portfolio into new services. Given the cutback in FmHA funds and the growing need for rural capital and jobs, such a step could prove mutually beneficial both to the Farm Credit System and the rural communities it already serves.

### D) Responsibilities of the System.

As the FCS moves into the 21st Century, it will have responsibilities to go along with the new challenges and opportunities.

There is an obvious need for System entities to continue to operate in a safe and sound manner, and at the same time extend credit to rural areas, agricultural producers and their cooperatives. A continued emphasis on director training, possible mergers of System entities, and evolutionary rule-making by the Farm Credit Administration will be part of a future Farm Credit System that is more efficient and more competitive.

At the association level, the System must work with the USDA Extension Service and private industry to provide our farmers and ranchers and coops with continuous education in the areas of (1) money management; (2) marketing of farm commodities and livestock; (3) value-added farm products; and (4) opportunities for niche marketing of specialty farm products, including organic and "natural" products, where appropriate.

CoBank, the nation's largest cooperative financial institution, will continue to support the export of farm commodities by U.S. marketing co-ops, through the GSM 102 and 103 programs which are administered by the Foreign Ag Service right here in USDA.



## E) Conclusion.

U.S. farm exports may be facing a couple of difficult years, depending on the outcome of agricultural trade talks at the GATT, the international energy situation and the health of the overall national economy.

These factors, coupled with currently low commodity prices, obviously suggest a lowering of net far income in the near term. As a farmer myself, I believe most producers will take a hard look at production inputs and do a better job of managing their money costs. Right now, I believe the big threat to farmers and the prices of their commodities is a world-wide trade war resulting from a total collapse of the GATT talks.

In the long run, I believe the future of U.S. production agriculture and its related agri-businesses is bright. I believe we have the natural resources in our soil and climate and the technological knowledge to give our farmers and ranchers the competitive edge in world trade in most of our basic commodities. The Farm Credit System, as a borrower-owned, single-sector lender to farmers, ranchers and cooperatives, will do everything it can to help them maintain their competitive edge.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## THE OUTLOOK FOR FARM CREDIT

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It's a pleasure to be here this morning discussing a subject that's close to all of our hearts and pocketbooks -- farm credit.

We've seen the role that credit availability has played on the farm over the last two decades, and in the process we've learned some very important lessons for the future.

Today the farm economy is healthier than it's been in many years. Farmers have generated near-record income. Farm debt has been cut by a third since 1983. And for the third straight year bank profitability has increased when measured by both return on assets and return on equity. The return on assets recorded by ag banks in 1989 was almost double that of all other banks.

Farm real-estate values have improved. Bank loan portfolios are stronger. Many distressed farms are back on their feet. Ag banks earned \$1.5 billion in 1989 -- \$200 million more than during the previous year.

It feels great to be saying this because just five years ago, ag banks weren't doing so well. More than 200 failed during 1983-1986 alone. Others experienced heavy losses. Since that time, however, ag banks in general have experienced a real and marked improvement in their loan portfolios. Capital in ag banks increased about \$400 million in 1989 over the previous year -- which helped them maintain their high capital-to-assets ratio. Charged-off loans also declined dramatically. Total assets of ag banks grew 3.1% in 1989, while farm production loans grew 7.8%; farm real-estate loans rose 5.7%; and all real-estate loans combined rose 6.6% over the same year.

In addition, many banks have been increasing capital as well as reserves against potential losses. New capital standards, increased deposit insurance premiums and tough regulation are making our ag banks even stronger for the future. The U.S. Department of Agriculture is forecasting that the net cash income of farmers in 1990 may hit a record range of \$59 billion to \$63 billion -- up 10% from last year -- a strong sign for the future. But, despite the rebound in the ag sector and the overall improvement in ag bank portfolios, agricultural banks have other concerns as well. For example, there's been growing concern

recently about the safety and soundness of the commercial banking industry. I'd like to address this larger safety and soundness issue before reviewing the current ag situation.

One thing we've learned from the hard years in agriculture is that banks tend to mirror the economies in which they operate. When there is trouble on the farm, ag banks feel the squeeze, and their business is affected accordingly. The same is true today -- particularly in the troubled northeastern region of the country -- where real estate problems are causing havoc.

The U.S. economy as a whole has slowed down significantly in recent months, and banks are definitely feeling the effects of rolling regional recessions. But unfortunately, in the public's mind, economic conditions affecting commercial bank profitability are being confused with the regulatory and management problems (and downright illegal activities) that dogged the thrift industry. Because of the tremendous cost and fall-out over the S&L bail-out, the tendency of politicians, the press and even the public is to overreact. On one level that's good. The lax regulatory environment that thrifts operated under was responsible for much of the excess that took place in that industry. But to try to make comparisons between commercial banks and thrifts is not only foolhardy but dangerous. Commercial banks have always operated under tough regulations and strict capital standards. Bank supervisors never adopted a laissez-faire attitude like some thrift supervisors. And today, rather than sitting back and waiting, bankers and bank regulators are more determined than ever to see that taxpayers aren't left holding the bag in a prolonged economic downturn.

That's not to say that there aren't problems facing our banks. Important issues need to be addressed on the national level, such as deposit insurance reform. It is to say, however, that misinformation is harmful because it can lead to unfounded panic and inappropriate action. It's easy to jump on the bandwagon and spread fear. It's a great deal harder to get the facts right.

The truth is, today the banking industry is in many ways stronger than it was five years ago when weakened farm and energy sectors seriously affected our industry. Overall, the vast majority of commercial banks in this country are healthy -- despite the regional recessions that are affecting general business activity. Today, 90 percent of the banking industry is operating profitably, and 50 percent of commercial banks will earn more this year than last year. Commercial banks now have over \$200 billion in capital, and in 1989 they earned more than \$16 billion. Capital is the primary safety net for depositors in the nation's commercial banks. Backing that up, of course, is the U.S. government's federal-deposit-insurance program for commercial banks.

The banking industry's deposit insurance fund has been strengthened, and the laws governing the fund have been revised to provide even greater stability in the future. The current premium rate banks pay for deposit insurance is four times what it was a few years ago. I think it bears mentioning that federal deposit insurance is paid for by the banks, not the taxpayers. The FDIC estimates that about \$3 billion in revenue will be raised in 1990 and \$4 billion in revenue in 1991. This does not include the approximately \$1 billion in interest earned from investments of the Bank Insurance Fund (BIF). Currently the Bank Insurance Fund -- which is administered by the FDIC -- has reserves of \$11 billion.

The bottom line is that the concerns of the commercial banking industry bear no resemblance to the problems of the thrift industry. As I said before, commercial banks live by tougher standards -- and always have. As the economy changes, banks will continue to build an even stronger safety net to make sure that they can meet whatever situations arise.

Unfortunately, there is great uncertainty in the economy today. Fluctuating oil prices, a troubled real estate sector and the threat of war in the Middle East are all contributing to public unease -- not to mention the very real possibility of recession.

A recent joke in Farm Implement News defined a recession as a time when you tighten your belt. A depression is a time when you have no belt to tighten, and panic is when you find yourself without pants!

Thankfully, we're not facing panic or a depression now, but neither are there cloudless skies ahead. For ag lenders, it's a good time to lend on the basis of what we can reasonably foresee in the future. There's plenty of credit available today -- the challenge is to lend in a reasonable and responsible way.

No industry -- least of all banking -- is immune to regional downturns and recessions. In the present economy we can expect regional difficulties to continue to affect business activity in some areas. Bankers need to be more concerned with the quality of loans they make than with pushing money out the door. Customers, too, must be aware of this need. Banks are ready, willing and able to make all the farm loans the ag sector needs, but we will not -- and cannot -- forego responsible and sound lending policies.

We need to think seriously about the kinds of credit needs we face on the farm right now -- and who can best meet those needs. The ABA was sufficiently concerned about this topic to provide a grant to industry consultants, Ely & Co., to conduct an



independent study of the Farm Credit Administration and the lending policies of the Farm Credit System. The thought-provoking conclusions in that report are Mr. Ely's alone -- ABA takes no credit or responsibility for them. But I can't say that we don't agree with many of his findings. Given the seriousness of this issue, ABA would welcome independent sponsorship of additional studies in this area by other interested groups. I don't think any of us here today want to chart policies for the future without first examining the problems of the past.

When it comes to lending practices, Mr. Ely found that the stakes are particularly high. The price of inappropriate lending is great, and the potential losses are large -- as we discovered in the aftermath of the Farm Credit Act in 1971. According to the findings of the Ely study, that legislation unleashed a boom in land prices in rural America that saw the inflation-adjusted value of farmland nearly double from 1971 to 1980. In 1971, the collateral limit on real estate lending by Farm Credit System institutions was raised from 65 percent of a farmer's income-producing value to 85 percent of its appraised value. Easy credit was readily available -- and that led to overlending. Easy and readily available credit -- whether in agriculture or real estate or anything -- can lead to boom-bust cycles.

Today farmers are still feeling the effects of their flirtation with cheap credit from the Farm Credit System. And it was the taxpayer who picked up the final tab. The fact is, there is no such thing as cheap or easy credit. And today, with the ag sector on the rebound, we need to guard against similar temptations.

We must ask ourselves if there are unmet credit needs in rural America today -- and, indeed, if there were unmet needs back in 1971. The Ely study suggests that agriculture in the early 1970s was not underfinanced.

There is no gap in agricultural credit today. Farmers' borrowing needs have shrunk by 45%. Agriculture now faces an overcapacity problem rather than a shortage of available credit.

It's disturbing that some Farm Credit System units are once again aggressively seeking new business -- and that the FCS is asking Congress to allow it to offer a wider array of financial services when no credit shortage exists. What's needed today is not broader lending powers, but restraint. There is no need for further expansion of federal credit programs at this time. To do so is to invite the return of old problems.

The danger in agricultural finance is equating cheap, easy credit with equity capital or net worth. Given the cyclical nature of the farm business, it's important that credit not be mistaken as

a substitute for net worth. Agricultural credit should be used to meet seasonal needs and expansion of farms. Easy, cheap credit is an illusion -- and we get into trouble when we believe otherwise. What we need to concentrate on is safe and sound lending and forget about expanding turf.

At the ABA, we've seen the emphasis placed on rural agricultural development and growing community bank activity -- there is no lack of commitment to lend to the farm. In fact, I appointed a new ABA ag task force during my presidency to look at the range of issues surrounding bank involvement in agricultural credit -- from the role of government guarantees to the structure of the public-private partnerships needed to deliver rural credit in the 1990s.

ABA is particularly sensitive to the problems that face small agricultural and community banks -- from the growing regulatory burden to the serious problems associated with environmental liability. This past year we were able to gather significant support in Congress for legislative change in the lender liability area, and we will continue to push for new legislation when Congress reconvenes in January. One of the rewards of leading the fight against unfair liability is seeing groups like the Environmental Protection Agency and the courts come to grips with the grave problems lender liability poses to both banker and farmer.

The bottom line is that commercial banks are dedicated to serving their communities and meeting farm credit needs to the fullest extent possible based on sound lending principles.

The recent farm bill was an indication of the type of change we can expect in the future. Despite our continued support for government programs like crop insurance, we may continue to see budgetary restraints -- like the five-year \$13.6 billion in budget cuts -- change the world in which we do business. We can best prepare for the future by correcting the lending mistakes of the past, positioning ourselves for inevitable changes in the future, and preserving the gains that we've fought so diligently for during the turnaround in the agricultural sector.

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## FIFTY YEARS OF PROGRESS IN THE NUTRITION FIELD

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As we begin the last decade of the 20th century, and look toward the challenges and responsibilities of the human nutrition field in the next, it would seem prudent first to look back at the accomplishments of the immediate past and note the current status of our progress. A period of 50 years has been selected, since my graduate training in nutrition started at that time.

### Nutrition--A Young Science

First it should be emphasized that nutrition is a young science. The nature of the oxidation of food and production of energy for the body was not clarified until 1774, only 226 years ago. And, it was not until 1891 that Wilbur O. Atwater, considered to be the father of human nutrition in this country, was appointed special agent in charge of nutrition programs for the Office of Experiment Stations, U.S. Department of Agriculture (Darby, 1975). He derived the "Atwater Units" of 4, 9, and 4 calories per gram for calculating the metabolizable energy content of foods based on their protein, fat, and carbohydrate content, respectively. He also initiated studies on food composition, energy requirements of humans, digestibility of foods, dietary intakes and food economics. But not until 1906 was the concept of "accessory food factors" described, which was followed in 1912 by the term "vitamine," given by an English chemist to a water-soluble factor which later turned out to be thiamin. In that same year, McCollum at the University of Wisconsin isolated a fat-soluble nutrient needed for cows and rats, and the vitamin era began. All the vitamins except two were discovered and isolated by 1940. Folic acid was isolated in 1946 and vitamin B12 in 1948. I can attest to the latter as my own Ph.D. thesis problem was to fractionate an unidentified growth factor for chicks, termed the "animal protein factor," which was vitamin B12.

### Deficiency Disease Era Ends

The advances made in nutrition during the first half of this century were truly fantastic and captured the attention of biochemists, physicians,

public health workers, food scientists, educators, economists, sociologists, epidemiologists, agriculturalists, and others. During this period, the knowledge needed to control the five historically important nutritional deficiency diseases (beriberi, scurvy, xerophthalmia, rickets, and pellagra) became available and was successfully applied. The era of frank nutritional deficiency disease was over by 1950. The success encountered during this period of prevention and cure of deficiency disease led several nutritional biochemists to study mechanisms of action at the cellular level, and to become molecular biologists. This is important, of course, but in the process, less and less research was directed toward the effects of foods and nutrients on the entire organism--or nutrition. And only in recent years have we realized the potential role of diet in the prevention or delay of onset of chronic diseases. Now most scientists and consumers recognize that their diet can affect their health aside from by preventing frank deficiencies.

### Definition of Nutrition

This leads to the need for a clearer definition of nutrition as a science. Although the application of nutrition programs usually involves several related disciplines, the science of nutrition has been defined by Griffith (1965) as the science of the regulation and response of metabolism to ingested food. It includes the assimilation and metabolic utilization of food components, including all processes involved in the body when food is digested, absorbed, and utilized. Nutrition differs from cellular and molecular biology by considering the entire organism. This point is stressed as many people seem to regard nutrition as synonymous with a dietary regimen, a view which is far too narrow. Human nutrition is a science that explores food as an energy source, as a provider of building material for tissue growth and maintenance, and as a regulator of metabolic pathways for normal functioning of genetically dissimilar individuals--ranging from low birth-weight infants, pregnant teenagers, lactating women, to the elderly--under varying conditions of activity, stress, and environment. Nutrition, in its application, should help prevent obesity and chronic diseases, improve immune response, support physical endurance, assist neurological functioning and extend the length and quality of life.

Despite the complex nature of nutrition in the whole person and the many factors that cause the nutritional needs to vary among individuals, it should be clear that applied nutrition programs should be based on nutrition knowledge, and not merely on the consensus of well-meaning and informed people. Epidemiologic studies of groups of persons can never be considered appropriate for providing answers to nutrition problems of individuals. For such information, human nutrition studies are required.

### Milestones in the Nutrition Field

- o 1941. Food and Nutrition Division, Bureau of Home Economics, USDA, moved its laboratory to Beltsville, MD. This was the forerunner of the current Beltsville Human Nutrition Research Center.



- o 1942. USDA cooperated with the Bureau of Labor Statistics in a survey of food consumption during wartime. Improvements over data collected in 1936 were reported, but low intakes of B vitamins, vitamins A and C, and calcium were noted. In 1955, national and regional surveys were performed of household food consumption and dietary levels.
- o 1943. First Recommended Dietary Allowances (RDA) established by the Food and Nutrition Board. The third revision in 1948 contained allowances for calories, protein, calcium, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid. The 10th edition, released in 1989, includes RDA's for 20 nutrients, including calories, and gives estimated adequate and safe ranges for 7 additional nutrients. Dr. Hazel Stiebeling, Assistant Chief of the Bureau of Home Economics, USDA, was involved in initiating the RDA's.
- o 1941-1945. During World War II, nutrition officers replaced medical officers in preventive medicine. It fell my lot as a Nutrition Officer in the Theatre Surgeon's Office, E.T.O., just after the stalags were discovered in Germany near the end of hostilities, to have three generals and a colonel descend on me in my Paris office to find out how few calories could be provided to prisoners and still maintain their health and conform to the Geneva Convention. Good data were collected about nutrient intakes, energy requirements, nutrient losses during preparation, and eating patterns of military troops. Special attention was given to the special nutritional needs of wounded on hospital trains.
- o 1950. USDA published new tables of food composition which was the first version of Agriculture Handbook No. 8. It contained values for proximate composition, three minerals, and five vitamins for 750 food items--raw, processed, and prepared. Atwater and Woods published the first table of chemical composition of American Food Materials in 1896, with values for protein, fat, water, and carbohydrate by difference. The latest series of the Handbook contains data for up to 64 food constituents.
- o 1955. The Interdepartmental Committee on Nutrition for National Defense (ICNND) was formed and started to conduct nutritional surveys in other countries, with counterparts from each country. Thirty-three country surveys were done, starting with Korea, Taiwan, and Pakistan. It was my good fortune to lead two of the survey teams and help brief most of the other U.S. teams as a consultant to the ICNND. This effort, led by Arnold Schaefer, involved approximately 500 scientists from at least 50 institutions and probably was one of the most successful international programs ever launched by an interagency committee. Protein-calory malnutrition, iron deficiency anemia, and vitamin A deficiency and blindness in children were the most commonly observed problems. These surveys helped many countries institute active public health programs in human nutrition.

- o 1961. USDA developed the Economy Food Plan, later used as a basis for judging poverty thresholds and estimating allowances needed for food in public assistance programs. In 1975-1976, revised food plans at low, moderate, and liberal cost to meet the 1974 RDA. A Thrifty Food Plan also was developed for use as a suitable base for setting allowances for the Food Stamp Program.
- o 1965. American Heart Association issued a statement on diet and heart disease:--Eat less animal (saturated) fat; substitute unsaturated vegetable oils; eat less cholesterol-rich foods; and if overweight, reduce calorie intake.
- o 1965. USAID and USDA devised a fortified children's food supplement for distribution to developing countries. It was my privilege, during a leave of absence from the University of Maryland to NIH, to help in the formulation of this product, which cost approximately 9 cents per pound. Its nutrient content was sufficient to render the diet complete if consumed at a level of 20 - 30%, with wheat, corn, rice, or millet making up the rest. The name was soon changed to CSM, for corn, soy, and milk, its main constituents in addition to the very complete vitamin and mineral mixes, which were used later to fortify other commodities.
- o 1965-1966. USDA conducted a nationwide survey of household food consumption, covering all four seasons and information on daily intakes of 14,000 individuals. Similar nationwide food consumption surveys were conducted in 1977-78 and 1987-88.
- o 1967. Senate Select Committee on Human Needs was established and held hearings about hunger and malnutrition, which later led to concerns about nutrition and chronic disease, and in 1977 issued a report on "Dietary Goals for the United States." This Committee, chaired by Senator McGovern, was a major factor in increasing the awareness of the Congress, various agencies, industry, and the public as to the importance of nutrition in development and public health.
- o 1968. Hunger USA was published, indicating that the extent of knowledge about dietary intake and malnutrition among the poor in the U.S. was inadequate to assess the problem. The report also stated that there must be a commitment by the Nation to the proposition that every child has the right to an adequate diet, and that every adult shall have the means to obtain an adequate diet. This led to major expansion of the USDA food assistance programs.
- o 1969. Scientists at Beltsville discovered that chromium, as a part of an organic complex, functions with insulin in the regulation of carbohydrate metabolism. The following year nickel and vanadium were found to be essential for animals maintained in a dust-free environment.
- o 1969. White House Conference on Food, Nutrition, and Health was convened by Dr. Jean Mayer of Harvard University. It was most

comprehensive with 26 panels meeting simultaneously. Each panel considered a specific topic and an extensive list of recommendations was developed. These had considerable impact on policy and programs that followed.

- o 1968-1970. The Ten-State Nutrition Survey was conducted in Washington, California, Texas, Louisiana, South Carolina, Kentucky, West Virginia, Michigan, Massachusetts, and New York. The findings indicated that a significant proportion of the population surveyed was malnourished or was at high risk of developing nutritional problems. The kinds and degrees of malnutrition observed varied from one location to another and within population subgroups, thereby preventing any generalizations. This large survey led to the Health and Nutrition Evaluation Surveys, CDC, which were begun in 1971-1972.
- o 1970. USDA dedicated a second human nutrition laboratory at Grand Forks, North Dakota, with a primary mission to determine the requirements of humans for trace elements. This laboratory has made significant contributions since that time, with a series of animal model and human studies conducted under controlled metabolic ward conditions. The human studies have focused on iron, zinc, copper, magnesium, and recently, boron. Animal studies have shown that dietary arsenic and silicon are required under certain conditions.
- o 1970. A USDA report on "Benefits From Human Nutrition Research" by C. Edith Weir was released which reviewed the probable benefits from proper nutrition in this country, especially as related to the role of diet in the prevention of obesity and diet-related chronic diseases. This report was provocative due to the lack of focused research to answer the questions the report raised. It was one of the first substantive reports to emphasize that most of the health problems underlying the leading causes of death could be modified by improvements in diet.
- o 1972. USDA established its first Departmental Committee on Food and Nutrition Research, as well as Departmental Committee on Food Safety, under Science and Education in the Secretary's office. It was my pleasure to serve as Chair of both of these bodies, which were quite active in stimulating interdepartmental coordination.
- o 1972. "Organic foods" came into their own, with claims that were exaggerated and difficult to confirm.
- o 1973. Nutrition labeling was initiated by the Food and Drug Administration. Labeling was optional for most foods but was required for others, as in the case of special diet foods. This has recently been revised to permit the addition of health claims consistent with scientific information.
- o 1975. The Nutrient Composition Laboratory was established as a part of the Beltsville Human Nutrition Research Center. This unique ARS

facility is dedicated to the development of methodologies for sampling, quality control, and analysis of nutrients and other components of foods. This laboratory works very close with HNIS in support of the food composition databank.

- o 1977. The Food and Agriculture Act of 1977, Title XIV, Section 1405, states:

"The Department of Agriculture is designated as the lead agency of the Federal Government for agricultural research (except with respect to the biomedical aspects of human nutrition concerned with diagnosis or treatment of disease), ...and the Secretary, in carrying out the Secretary's responsibilities, shall...establish jointly with the Secretary of Health, Education, and Welfare procedures for coordination with respect to nutrition research in areas of mutual interest..."

Section 1421(b) of the Act states: "It is hereby declared to be the policy of the United States that the Department of Agriculture conduct research in the fields of human nutrition and the nutritive value of foods and conduct human nutrition education activities..."

- o 1978. The Joint Subcommittee on Human Research of the Committee on Health and Medicine and the Committee on Food and Renewable Resources, Federal Coordinating Council on Science, Engineering, and Technology, Office of Science and Technology Policy, was formed with 11 member agencies. In FY 1979, the Joint Subcommittee reported total human nutrition research expenditures to be \$195 million, \$39.5 million of which was by USDA. This subcommittee was replaced with the current Interdepartmental Committee on Nutrition Research in 1983.
- o 1979. ARS initiated Human Nutrition Research Centers at Tufts University, Boston, MA, for studies of nutrition and aging and at Baylor College of Medicine, Houston, TX, for studies on the nutrition needs of children, pregnant and lactating women, and adolescents.
- o 1979. NIH initiated support of Clinical Nutrition Research Units (CNRU), which are designed to create and strengthen human nutrition research, training, and education through coordinated effort, intellectual stimulation, and use of shared resources at medical centers. As Nutrition Program Director, National Institute for Arthritis, Diabetes, Digestive and Kidney Diseases, I experienced great satisfaction in helping to initiate the CNRU program at NIH.
- o 1980. "Nutrition and Your Health: Dietary Guidelines for Americans" first issued by USDA and DHHS. Since then revised guidelines were released in 1985 and earlier this month. These dietary guidelines have been most useful in preventing over-statements and achieving harmony in nutrition education releases by Federal agencies. The Human Nutrition Information Service has developed a series of nutrition education



materials for teachers, professionals, nutrition educators, and the public to enhance the understanding and use of these guidelines.

- o 1980. Western Human Nutrition Research Center was established by ARS at the Presidio of San Francisco, with a mission mandated by Congress to develop improved methods for evaluating nutritional status and to conduct studies on human nutritional requirements. This became the fifth center in ARS/USDA to focus its research on problems in human nutrition.
- o 1983. Interagency Committee on Human Nutrition Research (ICHNR), was formed and cochaired by the Assistant Secretary of Health, DHHS, and the Assistant Secretary for Science and Education, USDA. ICHNR guided the development of the Human Nutrition Research Information Management System (HNRIMS), published in 1986 "Human Nutrition Research: A Federal Five-Year Plan," and convenes biennial conferences of Federally supported human nutrition research units and centers (next conference to be held at Lister Hill Auditorium, NIH, on February 20-21, 1991). The ICHNR has been an effective mechanism for coordination of human nutrition research activities at the Federal level.
- o 1984. A Subcommittee for Human Nutrition of the USDA Research and Education Committee, under the Secretary's Policy and Coordinating Council, was formed. This Subcommittee has served as the coordinating mechanism of human nutrition research and education activities in the Department. It prepares the Annual Report to Congress on USDA's Human Nutrition Research and Education Activities each year. A Dietary Guidance Working Group has been functioning under the Subcommittee for reviewing all releases from USDA which relate to dietary guidance to assure that all releases conform to current policies.
- o 1984. USDA convened the Human Nutrition Board of Scientific Counselors (as mandated by Congress) to advise the Secretary regarding program direction priorities, scope of activities, and quality of the Department's human nutrition research and education.
- o 1984. A USDA Food and Nutrition Policy Statement was issued by the Secretary.
- o 1985. The USDA/HNIS initiated its series of Continuing Survey of Food Intakes by Individuals, by collecting 1-4 day food and nutrient intakes on women 19 to 50 years of age and their children 1 to 5 years of age in the conterminous States. This type of survey approach, together with a running average for each age and sex group, is expected to replace the large nationwide surveys conducted at 10-year intervals.
- o 1988. Interagency Committee on Nutrition Monitoring (ICNM) was formally established in recognition of the need for sustained, coordinated efforts to monitor the nutritional status of the American people. ICNM has three active working groups which address food composition data needs, information dissemination and exchange activities, and means of strengthening survey complementarity.

- o 1988. The first "Surgeon Generals' Report on Nutrition and Health" was released with a summary of the evidence relating diet and incidence of chronic disease, with recommended diet changes for their prevention. This was followed in 1989 by the National Research Councils publication, "Diet and Health: Implications for Reducing Chronic Disease Risk" which further strengthened the basis for making dietary guideline recommendations.
- o 1988. The National Research Council, in its report "Designing Foods: Animal Product Options in the Marketplace" identified preferred nutritional characteristics of animal products, assessed current technologies and options open to consumers, and devised a strategy for constructive change in food products consistent with the current dietary recommendations.
- o 1990. Year 2000 national nutrition health promotion and disease prevention objectives announced by DHHS, "Healthy People 2000," contained specific nutrition related goals designed to prevent illness and premature death in the U.S.
- o 1990. Congress passed the National Nutrition Monitoring and Related Research Act of 1990 (H.R. 1608) for approval by the President.

#### Where Are We Now?

- o The Knowledge Base.--We do know more about the nutritional needs of people than we ever have before, but our knowledge base is still far from adequate. We have identified minimal levels of most essential nutrients for most people, but have little understanding about the toxic levels or optimal range of levels for individuals. We know that single nutrients work in unison with others and that the consumption of an excess of some may result in increased demand for others. The entire area of metabolic stress effects and the marked individual differences in this area is essentially unexplored, though important to the long-term health and well-being of each individual.

We have an impressive data base on nutrients in foods, without which one would have great difficulty in planning healthful diets. But even this area is incomplete for several nutrients, as well as for other phytochemical substances in foods of unique health significance.

Our understanding of those dietary factors which relate to chronic disease is embarrassingly limited, although hopefully progress is being made in reducing consumption, especially of saturated fatty acids. Yet there is no agreement as to which saturated fatty acids are the culprits. For example, saturated fatty acids with less than ten carbons and, perhaps, stearic acid may have little effect on serum cholesterol levels in most people.

Similarly, little is really known about the effects of various types of dietary fiber on digestion, absorption and metabolism, despite the many ways our food industry has found to increase "dietary fiber" in food products. For example, does anyone know whether the soluble fibers which are largely digested in the colon by bacterial action with an increase in the formation of secondary bile acids, is likely to be beneficial or detrimental to health?

We know that most people consume far less than the level of dietary copper estimated to be adequate for humans, and that fructose feeding increases the requirement for copper, especially in male rats. Copper deficiency in animal models leads to changes which are generally associated with coronary heart disease in man. We know that the consumption of fructose by Americans is on the increase, but it is unclear as to whether low copper intakes may be involved in the high incidence of coronary heart disease.

- o The Consumer Role.--Consumers are concerned about healthful diets. Consumer perception drives the market. Industry provides consumers with the products they will buy. But research-based information is needed to provide correct and lasting answers to the questions related to diet and health. We still have a shortfall in our knowledge base. The consumer is leading the market and consumer demand is based on their perception of what is best for them. Focused studies in humans are needed to provide the knowledge base for nutrition educators, professionals, industry, and for consumers. But progress is being made.
- o Changing Eating Patterns.--A recent paper (Stephen and Wald, Am. J. of Clinical Nutrition, 52:457) has reviewed 171 studies published since 1920-1984 on assessment of individual food intakes of all ages, all ethnic groups, and both sexes. Analysis by regression showed that fat provided an increasing amount of the dietary energy from 34% in the 1930's to 40-42% in the late 1950's to 1960's. The falling steadily to approximately 36% in 1984. this value for 1984 is similar to 37% and 35% of the energy from dietary fat observed in the 1-4 day continuing survey of food intake of women and children in 1985-86 respectively by USDA. Saturated fatty acid intakes also were found to decrease after the mid-1960's, while the intake of polyunsaturates increased. These values are in sharp contrast to the supply trends showing the amount of fat available for consumption during this period. It appears then that the amount of total fat and indeed the amount of saturated fatty acids consumed, as a function of energy, has been falling gradually during the past 25 years, and that this reduction in fat consumption has preceded the steady decline in mortality from coronary heart disease over the past 20 years.

Although data are lacking, it is presumed that the mean consumption in dietary fiber is beginning to increase. More fruits and vegetables based on supply are being consumed per capita--20% more in 1988 than in 1980 and 37% above 1971.

During the period from 1966-68 to 1986-88, the Economic Research Service has reported that consumption of chicken rose 72%, turkey 80%, fish and shell fish 38%, cheese 135%, low-fat milk 276%, broccoli 940%, cauliflower 180%, while beef consumption fell 7%, eggs 21%, whole milk 53%, butter 20%, and red meat 9%.

At the same time, the disposable income, on average, spent for food in the U.S. declined also from 22% in 1949 to just under 12% in 1988. During that period, the proportion of cost of food spent away from home to total food cost doubled from 19% to 38%.

- o Technological Advances.--Technology has exploded in recent years, giving the nutrition scientist and educator many new tools which can greatly extend the scope and effectiveness of programs. Computers and other improved communication devices will strengthen the systems approach to problem solving and enhance the transfer of technology to application. The use of radioactive isotopes has permitted the labeling of nutritional substrates and the ability to trace their metabolism in animal models, and to some extent in humans. But now scientists have the ability to enrich foods with non-radioactive stable isotopes for studies in pregnant women, infants, and all other age groups with no risk to the individual. Studies with stable isotopes can be used to measure size of metabolic pools, turnover rates and to compute requirements or toxicities. Improved instrumentation and methodology for separation and quantitation of extremely small amounts of specific metabolites or regulators permit such progress. Continued use of techniques as high pressure liquid chromatography, mass spectrometry, nuclear magnetic resonance (imaging), genetic probes, fluorescent tracers, and other sophisticated approaches should permit progress in the future at an even more rapid pace. Biotechnology and the ability to identify, sequence, and clone genetic material will permit an effective focus on the basis for differences in individual dietary needs.
- o Federal coordination and Support.--In my view, the extent and effectiveness of coordination of human nutrition activities at the Federal level has never been better. Representatives from all Federal agencies regularly meet to consider human nutrition research and nutrition monitoring efforts, with Assistant Secretaries from DHHS and USDA providing leadership. In addition routine information exchange and coordination is a structured activity in these Departments. The interactions across the Federal agencies are quite healthy and encouraging. All agencies seem to share the same common goal--to improve the nutritional status and health and well-being of the American people. In terms of policy makers, there is substantial visible support of this goal.



Budgeting support also has increased in the past 25 years. In my perusal of a report to Congress from the Agricultural Research Service in 1963, it was interesting to note that the FY 1963 ARS budget contained only \$.53 million for nutrition research of which \$.5 million was intramural support. Food Science and Food Consumption research were funded at levels of \$1.1 million and \$.31 million, respectively. HNRIMS projects in contrast in 1988 contained \$70 million for projects related to human nutrition research. From FY 1963 to FY 1991, the ARS budget for human nutrition research has grown from \$0.5 million to \$50 million or 8% of the total ARS budget. The NIH funding for human nutrition and related research, manpower development, training, and education amounted to \$276 million in FY 1988 or approximately 4% of the total NIH budget. In FY 1988, total funding for human nutrition research and education was \$300.6 million in DHHS and \$385 million for all Federal agencies. In FY 1990, USDA also expended \$168 million for human nutrition and information programs, including the Expanded Food and Nutrition Education Program (EFNEP) and the educational aspects of the Women, Infants, and Children (WIC) Program.

Of course, the budget is determined by the Congress and the President, and the overall need to limit Federal expenditures, even in high priority areas is clear. It is important, however, that policy makers recognize the huge impact proper nutrition can have in curtailing health care costs by preventing obesity and diet-related chronic diseases and promoting good health.

#### The Future Challenge

Despite the fact that the progress in human nutrition in the past is quite impressive, there is a huge area of unknown remaining. Actually, scientists are just beginning to ferret out and describe cellular level mechanisms and to identify the specific difference(s) and location(s) in genes that account for metabolic variation among individuals. Hopefully, this new information can be related to all of the other events which occur in the whole organism using mathematical modeling techniques. We can expect the development of even more sensitive instruments than are now available, and the greater use of stable isotope labeling. Yes, major advances will accrue in the building of a sound knowledge base for human nutrition.

In the future, better knowledge about food and nutrition can be expected to improve the quality of life and extend productive, healthful lifespans. Already, scientists at the Children's Human Nutrition Research Center have found ways to improve growth and development of low-birth weight infants and to improve their immune response. Studies on nutrition of adolescents, especially of the pregnant teenager, are expected to materially reduce the incidence of low-birth weight infants and infant mortality. Other studies of nutritional needs of the elderly and the role of nutrition in the aging process, conducted at the Human Nutrition Research Center on Aging at Tufts University, show that old, frail individuals respond to exercise if

adequately nourished; that dietary vitamin E can increase the immune response of the elderly; that the dietary intake of calcium, even after menopause, can reduce the loss of bone density and the onset of osteoporosis in women; that atrophic gastritis, observed in 30% of persons over 60 years, have greater needs for vitamin B12 and folacin due to poor absorption; and vitamin C and other antioxidant nutrients appear to be associated with a reduced incidence of cataracts in old people.

Already studies at the Western Human Nutrition Research Center, San Francisco, and at the Grand Forks Human Nutrition Research Center show that nutritional status (vitamin B6, zinc, copper, iron, boron) affects behavior and performance in animal models and in people. It is known that iron status affects temperature control and that certain stresses also are known to increase the need for nutrients. Already too, the Beltsville Human Nutrition Research Center and others have shown the risk for coronary heart disease and colon cancer is lowered by reducing the level of fat. Similarly, the value of complex carbohydrates and dietary fiber components have been shown to reduce glucose uptake, insulin production, and risk of developing mature onset diabetes. Genetic probes can be expected to identify traits of individuals that put them at risk, so that appropriate dietary measures can be implemented to prevent a dietary health problem. Nutritional status is believed to be related to the loss of tissue function and the aging process. It is not yet known that diet is related to the occurrence of Alzheimer's disease, but this too is not unlikely. These are but examples of the progress that can be expected to result from a more complete knowledge of human nutrition in the future.

The food supply can be expected to keep changing, as the consumers' perceived needs for a healthful diet is expressed in market demand. Since the consumers perception is largely based on various sources of information, including advertising, professional counseling, and various media, it will remain important to maintain strong nutrition education activities, where the information disseminated represents the best interpretation of science based knowledge available.

I am "bullish" about the future opportunities for human nutrition research and education in improving the long term health and well being of all people.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## DIETARY GUIDELINES FOR AMERICANS, 1990 REVISION

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In 1980, in 1985, and again in November 1990, the U.S. Departments of Agriculture (USDA) and Health and Human Services (HHS) published "Nutrition and Your Health: Dietary Guidelines for Americans" (1990). The dietary guidance messages of the 1990 revision are directed to healthy Americans 2 years of age and over and to the educators and health professionals who serve them. These messages are communicated nationwide through Extension, Food Assistance, and Public Health Programs. They are the statement of Federal nutrition policy.

I will discuss briefly how the 1990 revision was developed and highlight some of the changes made to the 1985 edition. I will give most attention to the three of the seven dietary guidelines that were changed most--those dealing with weight, dietary fats, and alcohol.

### The Dietary Guidelines Advisory Committee

In early 1989, the two departments convened the Federal Dietary Guidelines Advisory Committee to decide whether and how the guidelines should be revised. This Committee of nine noted nutrition scientists and physicians, chaired by Dr. Malden Nesheim of Cornell University, recommended revisions to the 1985 edition based on new scientific evidence on diet and health relationships. They drew heavily from recent reviews on this topic by the National Academy of Sciences (1989) and the Surgeon General (1988). They also recommended revisions to improve the usefulness of the bulletin to the public, based on USDA-sponsored research on the uses and usefulness of earlier editions.

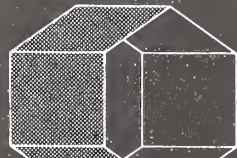
The Dietary Guidelines Advisory Committee's report to the two Departments (1990) presents the Committee's recommendations for the content of the 1990 revision, as well as the rationale for proposed changes. The report also summarizes results of the research on uses of earlier editions and written comments sent to the Committee by numerous individuals and groups. Copies of this report are available, while supplies last, from USDA's Human Nutrition Information Service, Federal Building, Hyattsville, MD 20782.

The responsibility for the bulletin rests with the two Departments that publish it. Some of their administrators, scientists, and editors helped form the final wording of the bulletin, based on the Committee's recommendations.

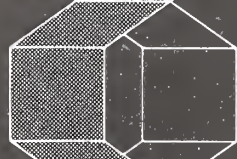


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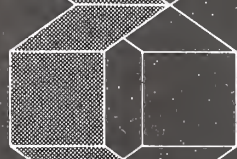
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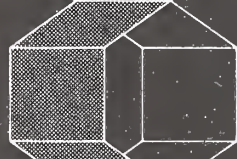
**Eat a variety  
of foods** page 5



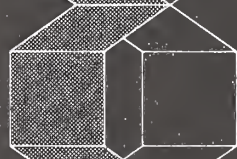
**Maintain healthy  
weight** page 8



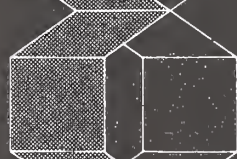
**Choose a diet  
low in fat, saturated  
fat, and cholesterol**  
page 13



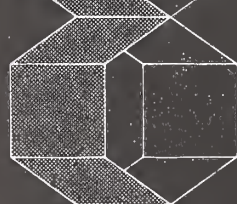
**Choose a diet  
with plenty of  
vegetables, fruits,  
and grain products**  
page 18



**Use sugars only  
in moderation**  
page 21



**Use salt and sodium  
only in moderation**  
page 23



**If you drink alcoholic  
beverages, do so in  
moderation** page 25

Third Edition, 1990.

U.S. Department of Agriculture

U.S. Department of Health and Human Services



## The Seven Guidelines

Committee members and Departmental reviewers agreed that the messages in the seven guidelines of the 1985 edition remain sound in 1990 and continue to be of major importance in choosing food for a healthful diet. Some changes were made in the wording:

- o "Eat a variety of foods" is retained. Variety is necessary in a diet that is enjoyable and provides for essential nutrient and energy needs.
- o "Maintain healthy weight" replaces "Maintain desirable weight" because a procedure is introduced to help people assess their weight relative to health outcomes.
- o "Choose a diet low in fat, saturated fat, and cholesterol" replaces "Avoid too much fat, saturated fat, and cholesterol." The new wording focuses on the total diet and is phrased in a more positive way.
- o "Choose a diet with plenty of vegetables, fruits, and grain products" replaces "Eat foods with adequate starch and fiber." This is specific food selection guidance, which our studies tell us users want. Also, it reflects the current science base that suggests that diets that include more foods with complex carbohydrates and a variety of foods containing dietary fiber are more healthful.
- o "Use sugars only in moderation" replaces "Avoid too much sugar" to better cover the foods targeted and to do so in a more positive way. A highlighted box with this guideline lists kinds of sugars, making it clear that they include not just table sugar, but also other caloric sweeteners such as honey, syrup, corn sweeteners, the high-fructose corn syrup used in many soft drinks, and fruit juice concentrate used increasingly in commercially prepared foods.
- o "Use salt and sodium in moderation" replaces "Avoid too much sodium." Salt is added because it is the main source of sodium, and salt is a better understood term. Again, the presentation is more positive.
- o "If you drink alcoholic beverages, do so in moderation" is retained.

## The Bulletin's Text

The text accompanying the 1990 guidelines differs from the 1985 text in both content and emphasis. For example, new emphasis is given to recommendations to decrease dietary fat, especially saturated fat, and to increase amounts of vegetables, fruits, and grain products in diets. Eating for enjoyment and health through variety and moderation, rather than dietary restriction, is suggested. Advice about food selection is more specific, as was requested by many bulletin users.

With each guideline is a highlighted box containing tips on how to put the guideline into practice. For example, the box with the guideline "Eat a

variety of foods" defines a varied diet in terms of servings of foods to have daily from five food groups, as suggested in USDA's Food Guide (Cronin, 1987, USDA, 1989). The reader is referred to the boxes with the fats and vegetables guidelines for information on what to count as a serving and for related food selection guidance.

The box with the fat guideline cautions the reader to use fats and oils sparingly, to choose liquid vegetable oils most of the time, and to check labels for the amounts of fat and saturated fat in a serving. Other portions of the box tell how to choose foods from the meat and milk groups to keep fat levels low.

A short action statement, "Advice for today," with each guideline (table 1) is directed to those bulletin users who find even this small bulletin more than they want to read.

### Healthy Weight

If you are too fat or too thin, your chances of developing health problems are increased. Being too fat is linked to high blood pressure, heart disease, stroke, the most common types of diabetes, certain cancers, and other types of illness. Being too thin occurs with anorexia nervosa and is linked with osteoporosis in women and greater risk of early death in both women and men.

The concept of "healthy" weight is introduced in the 1990 bulletin with a three-part interim procedure for checking your weight. It considers the amount of body fat, the location of fat in the body, and whether health problems requiring weight loss or gain exist. The scientific basis for the standards is presented in the National Academy of Sciences report. However, research on weight as it relates to health continues, and more precise guidance is expected within the next several years. The Committee and the Departments concluded that even though these assessment procedures may change, they should be presented for use on an interim basis.

To have a healthy weight, you must meet three conditions:

1. First, your weight is within the suggested range for persons of your height and age (table 2). At first glance this table, which replaces the table in the 1985 revision based on 1959 Metropolitan Life Insurance data, looks like good news to those women who have worked at weight control most of their lives. It recognizes that they can be a little heavier as they grow older without added risk to health. However, it also cautions that the higher weights in the ranges generally apply to men who have more muscle and bone. Women, who usually have less muscle and bone, should keep to the lower weights in the ranges.
2. Second, your body shape, as indicated by your waist-to-hip ratio, does not place you in the high-risk category. Abdominal fat appears to pose a special risk to health. You can check your waist-to-hip ratio this way: Measure around your waist near the naval while standing relaxed and not pulling in your stomach. Measure around your hips over the buttocks where

they are largest. Then, divide the waist measure by the hips measure to get your waist-to-hip ratio. You are at increased risk if it is close to or above "one"--or if your waist is as large as or larger than your hips.

3. The third condition is that you have no health problem for which your doctor has suggested that you lose or gain weight.

If you fail to meet any of the above three conditions, you are advised to check with your doctor about how your weight might affect your health and what to do about it.

For people trying to lose weight, a steady loss of 1/2 to 1 pound per week is suggested, rather than the 1 to 2 pounds advised in the 1985 edition. A 2-pound loss represents about a 1,000 calorie reduction per day. This is excessive and possibly dangerous for some people. The bulletin cautions about all extreme approaches to weight loss, such as following diets that severely restrict the variety of foods and calorie intake, inducing vomiting, and using medications--laxatives, amphetamines, and diuretics, for example.

### Reducing Dietary Fat

The 1990 guidelines give special emphasis to decreasing dietary fat, especially saturated fat, and increasing the consumption of vegetables, fruits, and grain products--foods with carbohydrate and fiber. These dietary changes are endorsed in both the Surgeon General's and the National Academy of Sciences reports and are a central dietary message of the National Cholesterol Education Program.

For the first time in the Dietary Guidelines, numerical goals are suggested for total fat (in an amount to provide 30 percent or less of calories) and for saturated fat (less than 10 percent of calories). These goals were introduced after consideration of their scientific soundness, their usefulness to the public, and the appropriateness of this bulletin for presenting them. They will be useful to professionals and to those other Americans with enough interest and information to assess their diets for fat content. Also, they will help counteract the incorrect idea that a healthful diet contains no fat.

The goals, expressed as percentages of calories, are not easy to use. If the fat content of foods is known, it is usually in terms of grams of fat and grams of saturated fat.

The bulletin shows how to figure the grams of fat that represents 30 percent of a 2,000-calorie diet. Multiply the 2,000 by .30 to get the calories represented; then divide the answer (600) by 9 (the number of calories from a gram of fat) to get the 67 grams of fat--the upper limit of fat for a 2,000-calorie diet.

These suggested goals are to be applied to a diet over several days, not to a single meal or food. They are not for use with children under 2 years of age, whose dietary needs differ from those of older people. Older children and adolescents are encouraged to eat lower fat diets but must also get sufficient

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Table 1. Advice for today, Dietary Guidelines 1990

- o Get the many nutrients your body needs by choosing different foods you enjoy eating from these five food groups daily: vegetables, fruits, grain products, milk and milk products, and meat and meat alternatives.
  - o Check to see if you are at a healthy weight. If not, set reasonable weight goals and try for long-term success through better habits of eating and exercise.
  - o Have your blood cholesterol level checked, preferably by a doctor. If it is high, follow the doctor's advice about diet and, if necessary, medication. If it is at the desirable level (200 mg/dl or less for adults), help keep it that way with a diet low in fat, saturated fat, and cholesterol: Eat plenty of vegetables, fruits, and grain products; choose lean meats, fish, poultry without skin, and lowfat dairy products most of the time; and use fats and oils sparingly.
  - o Eat more vegetables, including dry beans and peas; fruits; and breads, cereals, pasta, and rice. Increase your fiber intake by eating more of a variety of foods that contain fiber naturally.
  - o Use sugars in moderate amounts--sparingly if your calorie needs are low. Avoid excessive snacking and brush and floss your teeth regularly.
  - o Have your blood pressure checked. If it is high, consult a doctor about diet and medication. If it is normal (less than 140/85 mmHg for adults), help keep it that way: Maintain healthy weight, exercise regularly, and try to use less salt and sodium.
  - o If you drink alcoholic beverages, do so in moderation; and don't drive.
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Table 2. Suggested Weights for Adults

Height without shoes	Weight (in pounds) without clothes <sup>1</sup>	
	Ages 19 to 34	Ages 35 and over
5'0"	97-128	108-138
5'1"	101-132	111-143
5'2"	104-137	115-148
5'3"	107-141	119-152
5'4"	111-146	122-157
5'5"	114-150	126-162
5'6"	118-155	130-167
5'7"	121-160	134-172
5'8"	125-164	138-178
5'9"	129-169	142-183
5'10"	132-174	146-188
5'11"	136-179	151-194
6' 0"	140-184	155-199
6' 1"	144-189	159-205
6' 2"	148-195	164-210
6' 3"	152-200	168-216
6' 4"	156-205	173-222
6' 5"	160-211	177-228
6' 6"	164-216	182-234

<sup>1</sup> The higher weights in the ranges generally apply to men, who tend to have more muscle and bone; the lower weights more often apply to women, who have less muscle and bone.

Source: Derived from National Academy of Sciences' "Diet and Health" (1989)

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calories and nutrients for normal growth. People with established food habits, young and old, may need to work gradually toward meeting these goals.

#### Plenty of Vegetables, Fruits, and Grain Products

"Plenty" is defined as the suggested number of servings of these foods to eat daily. The numbers--3 or more servings of vegetables, including dry beans and peas; 2 or more of fruits; and 6 or more of breads, cereals, pasta, and rice--come from the food guide developed and used by USDA (1989). They are consistent with servings recommended in the National Academy of Sciences report. These three food groups, a part of the varied diet recommended with the first guideline, are emphasized because they are important sources of calories in diets low in fats. Also, they provide dietary fiber needed for proper gastrointestinal function, as well as other food components important to health.

The box with this guideline tells what counts as a serving and gives special advice on selections. It stresses the use of dark-green leafy vegetables, deep-yellow vegetables, and dry beans, and makes it clear that potatoes and corn count as vegetables, too.

Grain products from a variety of grains are suggested, and the need to have several servings of whole-grain products each day is noted.

#### Sugars and Salt

Moderation in the use of sugars and of salt and sodium is suggested. Advice accompanying these guidelines is updated.

- o All fermentable carbohydrates, not just sucrose, are noted as potentially cariogenic.
- o Advice for healthy teeth focuses on fluoride intake, avoiding excessive snacking, and dental hygiene.
- o Advice to get blood pressure checked is added. If it is high, checking with a doctor about diet and possibly medication is suggested. If it is normal, moderation of salt and sodium intake is suggested. This continues to be good advice because Americans consume much more salt and sodium than they need and consuming less will help those people whose blood pressure rises with salt intake.

#### Alcoholic Beverages

Text with the alcohol guideline is more specific than in the 1985 revision. It cautions about the high-calorie, low-nutrient characteristics of alcoholic beverages and about the link between drinking them and health problems, accidents, and addiction.

Certain groups are advised not to drink at all. They are women who are pregnant or trying to conceive; people who plan to drive or participate in

other activities requiring skill and attention; people using medicines; people who cannot keep their drinking at moderate levels; and children and adolescents.

For people who elect to drink alcoholic beverages, moderate drinking is defined as no more than one drink a day for women and no more than two drinks for men. Women can drink less because they are usually smaller than men and have proportionately less water in their bodies to dilute the alcohol. Also, new research indicates that women have about one-half as much as men of the enzyme that breaks down alcohol in the stomach before it enters the bloodstream (Frezza 1990).

#### The Bulletin's Design

The geometric design on the cover of the 1990 bulletin is the same as on the 1985 bulletin. However, the new bulletin will be immediately recognized as different because the background of the cover is black, rather than white as in 1985.

The centerfold's design again illustrates that all of the seven guidelines are to be used together in choosing a healthful and enjoyable diet. At the center and top of the design are the guidelines that form the framework for the diet, "Eat a variety of foods" for the nutrients you need and for calories to "Maintain healthy weight." Adjacent to these are the guidelines that highlight the need for many Americans to change their diets to be lower in fat, especially saturated fat, and to contain more vegetables, fruits, and grain products. In the lower part of the design, but not forgotten, is advice to use sugars and salt only in moderation and, if you drink alcoholic beverages, to do so in moderation.

In addition to the proposed text for the 1990 revision of the guidelines bulletin, the Dietary Guidelines Advisory Committee made several related recommendations to the two Departments. Programs are under way or planned to comply with these recommendations.

- Publish the 1990 edition; promote and distribute it extensively. Over 2 million copies of the 1990 edition have been printed by the two Departments, and more will be printed later. Single copies are available free from the Consumer Information Center, Department 514-X, Pueblo, Colorado 81009. The Superintendent of Documents will print the bulletin in quantity for groups wanting to distribute it to clients, employees, and customers; or negatives can be purchased for printing the bulletin elsewhere.
- Continue to use the guidelines as the policy basis for nutrition education and information programs of both Departments.
- Assess the understanding and use of the bulletin by different population segments.
- Promote food labeling that will help the public to follow the guidelines.

- Develop materials to help different population segments implement the guidelines. The USDA minibulletins, one for each guideline, developed to help consumers put the 1985 guidelines into practice, are being revised to incorporate the additions and refinements in 1990 guidelines. In the meantime, the 1985 versions can be used because the central messages of the two sets of guidelines are the same.
- Explore the need for separate interpretations for some groups, such as children and elderly persons. A bulletin directed to older Americans is nearing completion.
- Convene a new advisory committee in 1994 to review the guidelines again. New legislation (PL 101-445) requires review every five years.
- In addition, the Committee asked that the Public Health Service develop more precise guidelines for assessing healthy weight that consumers and health professionals could use to determine whether weight modification should be attempted.

In conclusion, I would like to leave you with these four points:

1. A system is in place for the maintenance of sound dietary guidance for Americans who are generally healthy.
2. This guidance is the "one voice" of Federal government in speaking to healthy Americans about what to eat and why.
3. Research indicates that the Dietary Guidelines are well accepted and broadly used.
4. They are the framework for more detailed and targeted dietary guidance from government and many other groups.

Thank you for any help you can give in promoting the new Dietary Guidelines bulletin and the messages it presents.



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# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91, Session #C2      For Release: Tuesday, November 27, 1990

## REPORT ON THE DIET AND HEALTH KNOWLEDGE SURVEY

Linda E. Cleveland, Nutritionist (Presenter)  
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Let's start with a question. This is one of the questions that was asked in USDA's 1989 Diet and Health Knowledge Survey. "On a scale from 1 to 6, where '1' is 'strongly agree' and '6' is 'strongly disagree,' how much do you agree or disagree with this statement: The things I eat and drink now are healthy so there is no reason for me to make changes." Choose "1" if you "strongly agree" or "6" if you "strongly disagree" or you may choose any number in between.

Almost two-thirds of our survey respondents agreed that the things they ate and drank were healthy, and saw no or little reason to change, rating this question a 1, 2, or 3 on the 6-point scale. One-fifth "strongly" agreed. Respondents' assessments of the quality of their diets may or may not be correct. That is one of the things that we can learn from the Diet and Health Knowledge Survey. How accurate are people's perceptions about their diets? Such information has major implications for nutrition education programs.

At last year's Outlook Conference, Dr. Robert Rizek described this latest addition to the surveys USDA conducts to monitor eating habits of Americans. The DHKS, as we call it, is the first national survey specifically designed to determine how peoples' attitudes and knowledge about healthy eating influence their food choices and, as a result, their nutrient intakes. We are excited about this new survey and the potential that it provides. Conceptually, the DHKS probes issues relating to the Dietary Guidelines for Americans: for example, acceptance of the Dietary Guidelines concepts, perceptions of how a person's own diet rates relative to the Guidelines, motivation issues related to following the Guidelines, and "how-to" knowledge that would allow a person to put the Dietary Guidelines into practice. We can use such information to improve our understanding of why people make the food choices they make. This is a unique data base and an important addition to the National Nutrition Monitoring System.

USDA's earlier surveys have provided information about what Americans eat, where they eat it, when they eat it, who they eat it with, and, at least in part, why they eat it. Information on the "why" comes from using sociodemographic data to identify factors that affect food choice--factors like age, sex, education, income, and participation in Federal food assistance programs. But never before have we had nationally representative data that can be used to determine directly how people's attitudes and their knowledge about nutrition issues affect their food choices. This capability comes from a survey design that links the Continuing Survey of Food Intakes by Individuals with the Diet and Health Knowledge Survey.

The 1989 Continuing Survey provides information on food intakes over 3 consecutive days for all members of each participating household. Data were collected using a 24-hour recall and a 2-day dietary record. Information was collected on the type and amount of each food eaten, whether or not salt was added during preparation, the type of fat used in cooking, the time and name of each eating occasion, and the source of the food--that is, was it from home food supplies or was it obtained and eaten away from home. Additional information was collected about factors that might affect dietary status, such as being on a special diet, having a health condition, using a vitamin or mineral supplement, and engaging in physical activity.

In each household, one member was identified as the main meal-planner/preparer. This individual was the respondent for the Diet and Health Knowledge Survey. About six weeks after participating in the Continuing Survey, the person identified as the main meal-planner/preparer was recontacted in a telephone follow-up, and the DHKS interview was conducted. The DHKS included 36 questions and took about 25 minutes to complete. Most of the interviews were conducted from a centralized WATS facility using a computer-assisted interview. Individuals without telephones were interviewed at home.

The following data come from the first three quarters of DHKS data collection--about 950 households. We have some demographic information for this data set, so results can be segmented by sex and age and by income.

Although we have completed the Continuing Survey and the DHKS, we have not processed all of the data. Thus, the DHKS results presented are preliminary and unweighted. The dietary data from the Continuing Survey are still being processed, so we have not yet had an opportunity to examine relationships between food and nutrient intakes in 1989 and the attitudes and knowledge of the main meal-planner/preparer.

In the DHKS, we asked respondents to evaluate the quality of their own diets with respect to 13 dietary components, such as fat, fiber, and calcium. The question we ask is: "In your opinion, should your diet be lower or higher in [various dietary components] or is it just about right

compared with what is most healthful?" Because of the link with the Continuing Survey, we can use answers from this question to see how accurately people rate their own diets. From the DHKS, we know how well people think they're doing, and from the Continuing Survey, we can determine how well they actually are doing compared to dietary recommendations. Using this information, we will be able to identify common misperceptions and the factors associated with them.

Our preliminary data suggest that perceptions and reality do not always match. For example, more than 40 percent of respondents said their diets were "about right" in fat. We haven't yet calculated how many and which ones actually were "about right," but in our 1985 Continuing Survey only 12 percent of women 19 to 50 years old had fat intakes at or below 30 percent of calories. That's the level recommended in the new Dietary Guidelines. For saturated fat, about half of the DHKS respondents thought their diets were "about right." In 1985, only 10 percent of women 19-50 had intakes meeting the current recommendation of less than 10 percent of calories.

For cholesterol, there may be a better match between perception and reality, although we will need data from the 1989 Continuing Survey before we know for sure. About half of meal planners who participated in the DHKS thought their diets were "about right" in cholesterol. And well over half of women aged 19 to 50 in 1985 had intakes at or below the 300 mg per day level recommended by some authoritative groups. These data are not strictly comparable because they come from different data bases and because the DHKS data covers both women and men, men being more likely to have intakes that exceed recommendations simply because they eat more food. Nonetheless, such information gives us clues about what we can anticipate when we analyze the 1989 surveys.

For all three of these dietary components--fat, saturated fat, and cholesterol--older women were much more likely than younger women to rate their diets "about right." For example, roughly one-third of women 15 to 29 years old thought their diets were "about right" in fat compared to over half of women 50 years and older. Trends were similar for saturated fat and for cholesterol.

Why such a large difference? Part of the explanation may relate to motivation. An age-related factor may affect belief in the importance of following guidance about fat and cholesterol.

We probe this issue by asking the question: "On a scale from '1' to '6', where '1' is 'not at all important' and '6' is 'very important,' how important is it to you personally to: Avoid too much fat? Avoid too much saturated fat? Avoid too much cholesterol?" About two-thirds of the sample as a whole rated it important to avoid too much fat--the 4's, 5's, and 6's on the 6-point scale. This is encouraging. Still, about one-third--more than we might wish--considered it unimportant. For



saturated fat and cholesterol, fewer considered it unimportant to avoid too much--less than one-sixth of DHKS respondents. It will be interesting to see how not only nutrient intakes, but also food choices, differ depending on responses to this question and to identify the characteristics of the different groups, especially those who have high intakes and also fail to consider the guidance important.

We do have evidence that perceived importance is age related. For example, older women were more likely than younger women to say that avoiding too much saturated fat was important, and their beliefs were stronger. That is, they were much more likely to say it was "very important." This may help explain why more older women thought their diets were "about right" in saturated fat. They believe in the guidance, are presumably motivated by it, and perhaps have made changes accordingly.

Let me now turn briefly to the Guidelines "Eat a variety of foods" and "Choose a diet with plenty of vegetables, fruits and grain products." We asked respondents to rate the importance of "eating a variety of foods," of "eating at least five servings a day of fruits and vegetables," and of "eating at least six servings a day of breads, cereals, and other grain products." The servings of fruits, vegetables, and grains are the minimum amounts suggested in USDA's Food Guide, which is included in the new edition of the Dietary Guidelines for Americans. The Food Guide defines what we mean by eating a variety of foods and quantifies what "plenty" of vegetables, fruits, and grains means. About 9 out of every 10 DHKS respondents thought variety was important. In contrast, only 7 out of 10 thought that eating at least six servings of grain products was important, and fewer thought that eating at least five servings of fruits and vegetables was important. In fact, more than 4 out of 10 said it was not important to eat at least five servings a day of fruits and vegetables, and to our surprise, close to 3 out of 10 said that it was "not at all important." People appear motivated to "eat a variety of foods," but they may need more information about what that means. They need to know how to put that guidance into practice.

The DHKS provides other types of information that can help us assess the ability of Americans to put guidance into practice. For example, we ask questions about knowledge of food sources of nutrients. We ask respondents to choose which of a pair of foods is higher in fat, or in cholesterol, or in fiber. For example, we ask, "Which is higher in fat, loin pork chops or pork spareribs? Hot dogs or ham?" We also ask some more generic questions. For example, we ask: "If a food is labeled cholesterol free, is it also: low in saturated fat, high in saturated fat, or it could be either high or low in saturated fat?" We are finding differences by age and income in responses to these questions. We also ask if people use the nutrition information on food labels in making food choices, and how often. Answers to these questions will help us know what types of information to highlight in our guidance materials.

Finally, I would like to present some data related to guidance about weight status. The change in wording in the new edition of the Guidelines from "Maintain desirable weight" to "Maintain healthy weight" is a good one. Our data suggest that, for many Americans, perceptions about weight may not match reality. The changed wording may help. When asked: "Do you consider yourself to be overweight, underweight, or about right?", 45 percent said they were overweight. According to national prevalence figures, about 25 percent are overweight. This figure has remained unchanged for at least a decade. The new emphasis on "healthy" instead of "desirable" weight and the provision of additional tools for judging "healthy weight" that are provided by the Guidelines may help to bring perceptions more in line with reality.

The DHKS also provides information about factors that can affect motivation to maintain a healthy weight. Most DHKS respondents said this was important to them personally. However, such valuing of appropriate weight is not in itself enough. Before people will make changes, they must believe that their actions will make a difference. They need a sense of control.

In the DHKS we asked respondents how much they agreed or disagreed with the statement: "Some people are born to be fat and some thin; there is not much you can do to change this." Almost half agreed. Low-income respondents were more likely to agree than high-income respondents. This is significant because we know that socioeconomic status below poverty is associated with higher prevalence of overweight. Thus, many individuals may benefit from information that improves their sense of control over their ability to lose weight, and special targeting of such information appears desirable.

We hope these preliminary results have whetted your appetite for more information. We are in the process of making plans for analyzing the DHKS data. We expect to publish a chartbook of results from the DHKS and at least one technical report, including data from both the Continuing Survey and the DHKS and covering the relationship between attitudes, knowledge, and diet quality.

#### NOTICE

This paper makes reference to preliminary data from the 1989 Diet and Health Knowledge Survey. If you want to receive more information when the final data are released, contact us at 301-436-5194.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
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## REPORT ON THE 1987-88 NATIONWIDE FOOD CONSUMPTION SURVEY

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The USDA's Human Nutrition Information Service is responsible for conducting surveys to obtain two types of information relating to food consumption: food used by households and food eaten by individuals. The first survey measuring household food use was conducted in 1936, and the first measuring individual food intake was conducted in 1965.

In 1985, USDA initiated the Continuing Survey of Food Intakes by Individuals, which includes only the collection of individual intake information. In 1989, HNIS initiated a new survey called the Diet and Health Knowledge Survey, which is being conducted as a telephone follow-up to the Continuing Survey. The combination of the Continuing Survey and the Diet and Health Knowledge Survey will enable us to relate an individual's actual dietary intake with his or her knowledge and attitudes about food and current dietary recommendations.

Data collection for the Nationwide Food Consumption Survey began in April 1987 and ended in August 1988. The sampling and data collection procedures are similar to the procedures used in the 1977-78 survey. The sample was designed to provide a multistage stratified area probability sample representative of the 48 conterminous States.

The sampling plan included four stages. Prior to the initiation of these stages, the 48 States were grouped into the nine census geographic divisions. Then, all land areas within the divisions were divided into three urbanization classifications: central city, suburban, and nonmetropolitan. This procedure resulted in 27 superstrata, which were then divided into 60 strata that corresponded to the geographic distribution, urbanization, and

density of the population.

In the first stage of sample selection, the 60 strata were further divided into smaller, relatively homogeneous units, called primary sampling units, based on political, economic, and demographic characteristics. Within each stratum all the primary sampling units were listed and two were selected.

The next sampling stage was the selection of area segments within each PSU. From the 120 PSU, a total of 1,000 area segments was drawn into the sample.

The third stage of sampling was the selection of households. Within each area segment, all housing units were identified and listed. A sampling rate was determined and a systematic sample of housing units was drawn.

In the fourth and final stage of selection, all individuals in sample households were identified and selected into the sample.

About 35 percent of the households drawn into the sample chose to participate. The response rate was lower than in previous surveys and much lower than we are comfortable with. Nonresponse is becoming an increasing problem for HNIS as well as for other public and private agencies that conduct surveys.

If respondents and nonrespondents have systematically different behavior, then survey results could be biased. We do not know the eating behavior of nonrespondents. However, the March 1987 Current Population Survey provides information about the characteristics of the population as a whole. Using 13 specific characteristics, we have compared the unweighted NFCS sample with the total population.

For most of these characteristics, the unweighted sample matched the population fairly well. For example, for females 20 and over 34.9% of the sample was age 25-39, compared to 35.0% for the population; 12.5% of the sample were age 70 and over, 12.6% of the population; homes were owned by 31.1% of the sample, 31.9% of the population; food stamps were received by 7.2% of the households in the sample, compared to 7.7% of the population.



Other characteristics did not match up as well. For females age 20 and over, 8.7% of the sample were age 20-24, compared to 11.2% of the population; 14.9% of the sample were 60-69, 12.5% of the population; household income levels were at or below 130% of the poverty level for 23.5% of the sample, 19.1% of the population; income levels exceeded 500% of the poverty level for 16.3% of the sample, 22.0% of the population; 43.4% of the female heads in the sample were working, compared to 50.6% of the population.

In order to adjust for some of the differences found, HNIS, in cooperation with statisticians at Iowa State University, has reweighted the individuals so that the sample characteristics match the population characteristics.

We are continuing to do studies on the survey nonresponse. Additional results will be available in the coming year.

The following data are based on day-1 intakes for 10,120 individuals.

The trends in percentage changes in average quantities eaten by our survey respondents between 1977 and 1987 are similar to those we saw for both men and women age 19 to 50 in the 1985 Continuing Survey. Survey respondents report eating less beef and pork, drinking less whole milk, and eating fewer eggs. They report eating more mixtures that are mainly meat, poultry, fish or mainly grain, and drinking more lowfat and skim milk and carbonated soft drinks.

The amount of the meat, poultry, fish group that survey respondents report eating has declined slightly, from 207 grams in 1977 to 193 grams in 1987. As a share of the total, mixtures are up but red meat (eaten separately, not as part of a mixture) is down. The apparent decrease in intake of red meat may or may not be real. Perhaps rather than eating less meat, individuals are just changing the way they eat it. When our new system for breaking mixtures into their component parts is in operation, we will have a better idea of how much meat is in those mixtures and whether or not individuals are really eating less meat.

As a share of the total, poultry; fish and shellfish; and frankfurters, sausages, and luncheon meats have all stayed about the same.

As you would expect, intakes of meat, poultry, and fish were higher among men than among women. For both men and women, intakes were highest in the middle years; for men, those aged 30 to 39 years, and for women, those aged 40 to 49 years.

Survey respondents report eating and drinking slightly less milk and milk products than we did 10 years ago. In 1977, the average intake of milk and milk products was 318 grams; in 1987, average intake declined to 290 grams. As a share of the total, fluid milk is about the same in both years, but lowfat and skim milk is up and whole milk is down.

The category "other fluid milk" accounted for a much larger share of the total in 1977 than it does now. Among other things, this category includes milk not specified as to type. More people knew what type of milk they were drinking in 1987 than in 1977. This may be partly due to better probing by interviewers in 1987. Also, individuals may have more concerns about their diet today than they did 10 years ago and may therefore be more aware of the type of milk they choose to drink.

The share of the total going for milk desserts, for cheese, and for other milk products remained stable between 1977 and 1987.

As expected, children still drink the most milk. Men and women aged 40 to 49 years drink the least. Overall, about half of the milk we drink is lowfat and skim. In 1987, the younger age groups drank more whole milk than lowfat and skim milk, whereas the older age groups reported the reverse--they drank more lowfat and skim than whole milk. The trend to drinking more lowfat and skim milk than whole milk begins in the 20 to 29 year age group for women but not until the 40 to 49 year age group for men.

Of the individuals surveyed, men eat more vegetables than women. However, for both sexes intakes by individuals in the older group are much larger than in the younger age groups. A greater proportion of the vegetables eaten by the younger compared with the older men and women are white potatoes, a category that includes french fries. For example, 49 percent of the vegetables eaten by males age 12 to 19 years are white potatoes, while only 26 percent of the vegetables eaten by males age 70 and over are white potatoes. Over 25% of the teenage males reported french fries on the day of the survey.

In 1987-88, citrus fruits and juices accounted for more than two-fifths of individuals' intake of total fruits. For men the largest intakes of citrus fruits are among those 12 to 19 years, 60 to 69 years, and 70 years and over. For women, citrus intakes are high in the same age groups plus those age 50 to 59 years. For most sex/age groups, less than 20 percent of citrus intake is in the form of a fruit; the rest is in the form of juice. Older individuals get more of their citrus in the form of fruit than do younger individuals.

We are eating more grain products than we did 10 years ago. Average intake of grain products in 1987-88 was 237 grams, up from 215 grams in 1977-78. Most of the increase in average intake was for mixtures and for cereals and pastas. The average intake of yeast breads and rolls declined slightly.

In addition to looking at the average intakes, we can look at the data in another way. The bars in this slide provide information on the share each grain product subgroup is as a share of the total grain product intake in 1977 and 1987. As a share of the total, grain mixtures such as pizza, spaghetti, and macaroni and cheese have increased, while yeast breads and rolls have decreased. Although the absolute intake of cereals and pastas increased in the last 10 years, as a share of the total it has stayed about the same. The fourth category on these bars is called "other." It includes quick breads, pancakes, french toast, cakes, cookies, pastries, pies, crackers, popcorn, pretzels, and corn chips. As a share of the total, this category has declined slightly.

In 1987, the mean intakes of grain mixtures were larger for the younger age groups than for the older ones. Males age 12 to 19 ate about 80 grams of mixtures that were mostly grain. The comparable figure for men age 50 to 59 is about 50 grams. Women ate smaller amounts but the trend is similar--average mean intakes were higher for younger than for older women. This slide shows data for 1987 only. But from having looked at the data for 1977, I can tell you that most sex/age groups had larger mean intakes of grain mixtures in 1987 than in 1977. Considering the increase in the number of pizza delivery services, this should not be surprising. About 10% of teenage males reported pizza on the day of the survey, compared to about 2% for males 60 and over.

At every age group, men's intake of cereals and pastas is slightly higher than that for women, until age 60. Older women have higher intakes of cereals and pastas than do older men. Ready-to-eat

cereals make up about 23 percent of the cereals and pastas group. This percentage varies by age, however. The intake of ready-to-eat cereals, as a proportion of all cereals and pastas, is highest by children and teens.

Data from NFCS indicate some demographic differences in the percentage of individuals eating eggs: A greater percentage of blacks than whites ate eggs, and a greater percentage of individuals in the South and West than in the Northeast and Midwest ate eggs.

For the total U.S., the amount of eggs reported has declined, as has the percentage of individuals using eggs. In 1977, 31 percent of individuals ate eggs on the survey day; in 1987, this dropped to 23 percent. Clearly, the concern about cholesterol has had an impact. New data from the National Nutrient Data Bank indicate that there is less cholesterol in eggs than we believed 10 years ago.

In 1977-78, a larger percentage of individuals reported coffee than reported tea, fruit drinks and ades, and soft drinks. In 1987-88, however, similar percentages of individuals reported coffee and soft drinks.

It is the teens and young adults who drink the greatest amounts of soft drinks as indicated on this slide. This was true in 1977-78 also. Since then, individuals in all sex/age groups have increased their intake of soft drinks. Of particular interest is the increase in amounts of low-calorie soft drinks reported. In 1977, about 14 percent of the soft drink intake was for low-calorie drinks, climbing to 26 percent in 1987. For some sex/age groups in 1987, the proportion of soft drink intake accounted for by low-calorie soft drinks is much higher. For men age 50 to 69 years and women age 40 years and over, more than 40 percent of soft drink intake is low-calorie.

The food intakes of individuals from the 1987-88 survey were evaluated for food energy and 27 nutrients and dietary components. Mean intakes of calories by women 20 and over were lower in 1987 than in 1977, while intakes of vitamin A, vitamin C, and calcium increased slightly. Mean intakes of iron were the same in both years.

The pattern for men is similar to that for women--a drop in



intakes of calories and an increase in intakes of vitamins A and C, and calcium.

The percentage of food energy from fat by all individuals declined by 4 percentage points -- from 40 percent in 1977 to 36 percent in 1987. In 1987-88, saturated fatty acids accounted for 13 percent of total calories, monounsaturated fatty acids for 13 percent, and polyunsaturated fatty acids for 7 percent. The percentages for saturated fatty acids are higher for young children and decline slightly with age. The percentage of food energy from protein was the same in 1987-88 as it was in 1977-78--16 percent, while the percentage of food energy from carbohydrate increased from 43 percent to 47 percent over the 10-year period.

The mean 1-day intake for all of the male age groups 12 years and older exceeded 300 milligrams of cholesterol, while women's intakes were, on average, below 300 milligrams. For adult men, the values ranged from 312 milligrams for those age 70 years and over to 399 milligrams for those age 30 to 39 years. For adult women, the values ranged from 225 milligrams for those age 70 years and over to 258 milligrams for those age 50 to 59 years.

In general, dietary fiber intake was highest in the older age groups. Intakes for adult men age 20 and over averaged 15.2 grams, while women age 20 and over averaged 11.3 grams. For men the age group 70 and over had the highest mean intake of fiber, 16.8 grams. For women the highest mean intake was 12.5 grams for those age 50-59.

Mean intakes by all individuals and by most sex/age groups exceeded the RDA for protein, vitamin A, vitamin C, thiamin, riboflavin, niacin, folate, vitamin B-12, and phosphorus. For the six nutrients intakes by a number of sex/age groups are below the RDA--vitamin E, vitamin B-6, calcium, iron, magnesium, and zinc. Before the release of the 10th edition of the RDA's, folate would have been in this group. Since the RDA for folate dropped considerably, mean intakes are no longer below the RDA for this nutrient.

Of the six nutrients, some sex/age groups of men were low in all but iron. Magnesium and zinc are the two nutrients which were particularly low for men. Females age 12 through 49 had mean intakes below the RDA for all six of these nutrients, and their diets were particularly low in the four minerals. Iron intakes for women age 50 and over were above the RDA.

Women 20 years and over in all three income groups had intakes below the RDA for the same six nutrients. However, higher income women did slightly better for all nutrients except iron.

For men 20 years and over, intakes relative to RDA were higher than they were for women. Mens' iron intake was well above the RDA. Vitamin E and calcium intakes were below the RDA only for the low-income group. Except for zinc, mean intakes as percentages of RDA tended to be slightly higher for the high-income group than for the low-income group.

Children age 5 years and under had mean intakes below the RDA for vitamin E, calcium, iron, and zinc. Their diets were particularly low in vitamin E and zinc.

I have given you only a small sample of the type of data available from the 1987-88 Nationwide Food Consumption Survey. The full set of individual intake data tapes are available for purchase from the National Technical Information Service (Telephone # 703-487-4650, Accession No. PB 90-504044). Household data and data from the low-income survey will be available in 1991, along with the first survey reports.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## CURRENT EFFORTS TO IMPROVE THE SOVIET FREIGHT TRANSPORTATION SYSTEM

Robert S. Scavone  
Vice President, Finance & Planning, Atlantic Division  
Sea-Land Service, Inc.

GOOD MORNING. THANK YOU FOR INVITING ME HERE TODAY TO ADDRESS THE CHANGING FACE OF TRANSPORTATION ACROSS THE SOVIET UNION. I WILL SPEAK PRIMARILY ABOUT SEA-LAND'S AGREEMENT WITH SOVIET OFFICIALS TO HELP THAT COUNTRY MODERNIZE ITS RAIL FREIGHT SYSTEM. THIS AGREEMENT -- OR PROTOCOL -- IS REALLY AN ARRANGEMENT FOR US TO WORK TOGETHER TO MAKE AN EXISTING SYSTEM WORK BETTER -- FOR THE ECONOMIC BENEFIT OF THE SOVIET UNION, FOR SEA-LAND, AND FOR ANY USERS OF THE IMPROVED RAIL SYSTEM.

TO PUT MY PRESENTATION IN ITS PROPER CONTEXT, I'D LIKE FIRST TO BRIEFLY DESCRIBE SEA-LAND, THEN TO IDENTIFY THE GLOBAL MARKET TRENDS WHICH HAVE LED IT TO THE SOVIET UNION, WHICH IN TURN HAVE LED TO OUR HISTORICAL AGREEMENT TO WORK JOINTLY TO IMPROVE THE RAIL SYSTEM. I BELIEVE YOU WILL SEE THAT THE OBJECTIVE OF SEA-LAND TO CULTIVATE THE CONTAINERIZED SHIPPING MARKET THROUGH THE SOVIET UNION, IN FACT, SERVES THE PURPOSE OF IMPROVING AVAILABLE RESOURCES FOR NON-CONTAINERIZED TRANSPORTATION, AND FOR BUSINESS IN GENERAL.

ON A COLD DAY IN 1956, SEA-LAND SERVICE PLACED 58 TRUCK TRAILERS ON THE DECK OF A VESSEL NAMED THE IDEAL-X AND MOVED THE CARGO INSIDE THOSE TRAILERS -- OR CONTAINERS -- FROM NEWARK TO HOUSTON. NOW, AS A SUBSIDIARY OF CSX CORPORATION SEA-LAND CONDUCTS CONTAINER SHIPPING OPERATIONS IN EVERY TIME ZONE IN OVER 70 COUNTRIES.



DURING THE COURSE OF THAT GROWTH, WE HAVE NOT BEEN STRANGERS TO CENTRAL EUROPE OR TO EASTERN EUROPE. FOR INSTANCE, NEXT QUARTER WE WILL BE CELEBRATING A QUARTER-CENTURY OF SERVICE TO POLAND. ADDITIONAL SEA-LAND OFFICES ARE OPENING IN BUDAPEST, BERLIN, CZECHOSLOVAKIA, AND WE HAVE RECENTLY ARRANGED TO PROVIDE DIRECT SERVICE TO OUR FINNISH CUSTOMERS THROUGH OUR AGENCY IN HELSINKI.

NOW WE HAVE ENTERED THE TRANSPORTATION PICTURE IN THE SOVIET UNION, WHICH WE AT SEA-LAND SOMETIMES THINK OF AS THE "LAST FRONTIER", OR LAST LINK, IN WHAT HAS BECOME FOR US A TRANSPORT SERVICE CAPABILITY WHICH CIRCLES THE WORLD. THE ONGOING CHANGES IN THE SOVIET UNION REALLY REPRESENT AN EXTENSION OF THE RAPIDLY EMERGING CARGO MOVEMENT TRENDS THAT, IN FACT, HAVE ENVELOPED THE GLOBE.

THE WORLD OF CONTAINERIZATION IS UNDERGOING RAPID CHANGE -- AND UNPRECEDENTED GROWTH.

IN THE NEXT FEW YEARS, CONTAINERIZED TRADE IS PREDICTED TO ACCELERATE AT A RATE OF EIGHT PERCENT A YEAR. YET, WHERE THE BULK OF CONTAINER TRADE FORMERLY CENTERED ON MOVEMENT TO AND FROM NORTH AMERICA, BY 1994 THESE ROUTES WILL COMPRISE LESS THAN HALF OF THE WORLD'S TOTAL CONTAINER TRAFFIC.

FOR SEA-LAND, AS A U.S.-FLAG COMPANY, THIS SHIFT FROM OUR PREVIOUSLY STRONGEST BASE, NORTH AMERICA, IS A BIG ISSUE. WE HAD TO FACE THE FACT THAT FUTURE GROWTH IN NORTH AMERICAN TRADES, WHERE WE -- AND THE OCEANBORNE TRANSPORTATION INDUSTRY IN GENERAL -- HAVE ENJOYED A LONG HISTORY OF STRENGTH, JUST WOULDN'T BE THERE.

WE NEEDED TO RE-ORIENT OUR MARKETING AND OPERATING STRATEGIES TO TAKE ADVANTAGE OF NEW BUSINESS OPPORTUNITIES IN OTHER AREAS OF THE WORLD.

I DO NOT MEAN TO PAINT A BLEAK PICTURE REGARDING NORTH AMERICA. THIS TRADING BLOCK STILL PRESENTS THE WORLD'S LARGEST RELATIVE GNP -- 5.8 TRILLION DOLLARS. IT JUST DOES NOT REPRESENT THE MAJOR GROWTH AREA IN CONTAINERIZED TRADE.

ALONG WITH THE CHANGES IN NORTH AMERICAN TRADE PATTERNS, EUROPE IS UNDERGOING SWEEPING CHANGES OF ITS OWN. THE NEW, ONE-MARKET EUROPE THAT IS EMERGING AS 1992 APPROACHES WILL PROVIDE THE WORLD WITH ITS LARGEST AND RICHEST CONSUMER BASE -- 324 MILLION PEOPLE, WITH ROUGHLY A FOUR-TRILLION-DOLLAR BUYING POTENTIAL. IF WE ADD TO THIS THE 31.7 MILLION PEOPLE OUTSIDE THE 12 EC MEMBER COUNTRIES AND THE 400 MILLION CONSUMERS THAT MAKE UP CENTRAL EUROPE AND THE SOVIET UNION COMBINED, WE SEE THAT THERE EXISTS A STRONG RESOURCE OF CONSUMERS -- AND POTENTIAL SHIPPERS.



IN THE FAR EAST, IT IS NOTEWORTHY THAT JAPAN ALONE REPRESENTS A 2.8 TRILLION DOLLAR GNP.

THE ASIAN POPULATION IS MANIFESTING AN INCREASING DESIRE TO CONSUME HOME-BASED PRODUCTS. ECONOMISTS THEREFORE ARE PREDICTING A SEVEN TO TEN PERCENT GROWTH IN INTRA-ASIA TRADE OVER THE NEXT FEW YEARS.

SO WE SEE SEVERAL PATTERNS:

- o A DECLINE IN CONTAINERIZED TRADE INVOLVING NORTH AMERICA.
- o A GROWING FAR EAST CONSUMER BASE.
- o A GROWING EUROPEAN CONSUMER BASE.

WE ALSO SEE PREDICTIONS OF A SIGNIFICANT TRADE INCREASE BETWEEN ASIA AND EUROPE. LAST YEAR'S OVERALL CONTAINER MARKET VOLUME IN BOTH DIRECTIONS BETWEEN ASIA AND EUROPE EXCEEDED 1.4 MILLION FORTY-FOOT EQUIVALENT UNITS, OR FEU'S. THIS YEAR, IT WILL SURPASS 1.7 MILLION FEU'S.

OVER THE NEXT FIVE YEARS, IN FACT, OF THE THREE ARTERIAL TRADES, THE ASIA-EUROPE LEG IS FORECAST TO GROW THE MOST, AT AN ANNUAL RATE OF ABOUT SEVEN PERCENT, COMPARED TO FOUR PERCENT FOR TRANS-ATLANTIC AND FIVE PERCENT FOR TRANS-PACIFIC.

UNTIL NOW, ALL WATER TRANSIT BETWEEN ASIA AND EUROPE WOULD TAKE AN AVERAGE OF ABOUT 30 DAYS, MOVING ALONG A 13,000 MILE ROUTE THAT INCLUDES PASSAGE THROUGH THE SUEZ CANAL.

SEA-LAND'S OWN ASIA-MIDDLE EAST-EUROPE -- OR AME -- SERVICE, A COOPERATIVE AGREEMENT WITH THE SWISS CARRIER NORASIA, HAS BEEN CARRYING CARGO ALONG THIS ROUTE FOR THREE YEARS, WITH EMPHASIS ON SERVING MIDDLE EAST COUNTRIES AND THE SUBCONTINENT.

THE AME SERVICE HAS BEEN RUNNING AT CAPACITY AND, IN FACT, IS PREDICTED TO GROW EIGHT TO TEN PERCENT ANNUALLY.

THIS IS WHERE THE SOVIET "LANDBRIDGE", AS IT IS KNOWN IN THE INDUSTRY, ENTERS THE PICTURE. THE IMPLICATIONS OF THE GEOGRAPHIC POSITION OF THE SOVIET UNION FOR EFFECTIVE LANDBRIDGE SERVICES ARE OBVIOUS.

HERE, AN 8,000-MILE-WIDE LANDMASS CONNECTS THE WORLD'S MOST PROMISING TRADE LANE. YET, AS OF 1989, LANDBRIDGE ARRANGEMENTS, INCLUDING TRANS-SIBERIAN RAILWAY BLOCK CONTAINER TRAINS, PROVIDED LESS THAN TWO PERCENT OF TRADE CAPACITY. CARRYING ONLY 40,000 FORTY-FOOT CONTAINER EQUIVALENTS OUT OF A POTENTIAL CAPACITY OF 125,000, THE TRIP COULD TAKE UP TO 40 DAYS.

IT IS NOTEWORTHY THAT THE CURRENT LANDBRIDGE SYSTEM HAS BEEN OPERATING FOR OVER A DECADE. THE STATE-OWNED FORWARDER, SOTRA, TOOK SOLE RESPONSIBILITY FOR SELLING THE SERVICES OF THE TRANS-SIBERIAN RAILWAY. THE RAILWAY ITSELF IS REALLY A COLLECTION OF 32 OPERATING COMPANIES PROVIDING SERVICE AS THE RAIL MOVES THROUGH THE VARIOUS REPUBLICS. HARD CURRENCY EARNINGS, PLACED IN THE SOVIET GENERAL FUND, WERE PAID OUT TO THE SERVICE PROVIDERS ALONG THE ROUTE ON A COST BASIS.

THERE REALLY WAS NO OVERWHELMING INCENTIVE FOR THOSE INVOLVED TO INVEST IN SERVICE IMPROVEMENTS.

NOW, KEY CHANGES ARE TAKING PLACE. PARTICIPANTS HAVE MOVED FROM TOTAL STATE CONTROL TO JOINT STOCK COMPANIES, WITH HARD CURRENCY EARNINGS DIVIDED AMONG THEM, THEREBY INTRODUCING A PROFIT MOTIVE.

A SOVIET RAIL ASSOCIATION HAS BEEN CREATED TO COORDINATE COMMERCIAL RAIL ACTIVITIES OF THE 32 INDIVIDUAL SOVIET RAILROADS. SINCE AUGUST OF THIS YEAR, ROUND-TRIP UNIT TRAINS HAVE BEEN PROVIDING SHUTTLE BLOCK SERVICE BETWEEN EAST AND WEST BORDERS ON AN 11 TO 12 DAY TIMETABLE.

PRIOR TO LAST SUMMER, LOCOMOTIVES WERE CHANGED EVERY 400 MILES BETWEEN FAR EAST AND WESTERN TERMINALS. WITH THE FORMATION OF THE ASSOCIATION, LOCOMOTIVES NOW ARE CHANGED ONLY FOUR TIMES ALONG THE ENTIRE 8,000-MILE ROUTE, SIGNIFICANTLY CUTTING DOWN ON TRANSIT TIME.

SO WE HAVE A BURGEONING TRADE LANE; A NATURAL GEOGRAPHIC ROUTE FOR THAT LANE; AND LANDBRIDGE RAIL SERVICE THAT HAS BEGUN TO MAKE NEEDED CHANGES EVEN PRIOR TO SEA-LAND INVOLVEMENT.

AND WE HAVE SEA-LAND, A COMPANY DEDICATED TO INTERMODAL CAPABILITY FOR 34 YEARS, WITH ESTABLISHED PRESENCE IN ALL MAJOR AREAS OF GLOBAL COMMERCE.

COMMERCE AND FAVORABLE GEOGRAPHY WOULD MEAN NOTHING, HOWEVER, IF THE POLITICAL ATMOSPHERE WERE NOT JUST AS FAVORABLE.

NOW, FOR THE FIRST TIME IN THE MILLENNIUM-PLUS HISTORY OF THE SOVIET UNION, WE HAVE A GOVERNMENT OPEN TO CREATING A FREE-MARKET ECONOMY, ALBEIT WITHIN A SOCIALIST POLITIC.

ENTERING THE SOVIET TRANSPORTATION ARENA REQUIRED SOMEWHAT OF A TURNABOUT IN ATTITUDE. THE UNITED STATES -- AND MOST BUSINESSES HERE -- TRADITIONALLY HAVE NOT CONSIDERED THE SOVIET UNION A POTENTIAL COMMERCIAL ALLY.

IN FACT, IT PROBABLY WOULD BE SAFE TO SAY THAT AGRICULTURAL PRODUCT INTERCHANGE IS ONE OF THE FEW AREAS THAT LED THE WAY FOR OTHERS TO FOLLOW.

EMERGING FROM 40-PLUS YEARS OF COLD WAR CREATES AN ENTIRELY NEW RELATIONSHIP, REQUIRING THE DEVELOPMENT OF A SENSE OF TRUST ON BOTH SIDES.

IN WORKING OUT THE RAIL PROTOCOL, SEA-LAND HAS OBSERVED A NEW WILLINGNESS ON THE PART OF SOVIET AUTHORITIES TO DISCUSS OPENLY THEIR REAL NEEDS AND PRIORITIES, INITIATING THE WORKING DIALOGUE THAT PREVAILS TODAY. ONCE THEY DECIDED THAT SEEKING ASSISTANCE IN SOLVING THESE PROBLEMS WAS ACCEPTABLE, AND EVEN DESIRABLE, WE WERE ABLE TO OFFER OUR EXPERIENCE TO ASSIST IN THE DEVELOPMENT OF A TRULY COMMERCIAL INTERMODAL TRANSPORT SYSTEM.

ALONG WITH THIS MELLOWING TREND IN INTERNATIONAL RELATIONSHIPS, THERE IS A SIGNIFICANT TREND TOWARD ENTREPRENEURISM THROUGHOUT THE SOVIET UNION.

ENTREPRENEURISM IS, ACCORDING TO PATRICIA AUBERDENE AND JOHN NAISBITT, THE AUTHORS OF THE BEST-SELLER "MEGATRENDS", ONE OF THE BIGGEST SOVIET GROWTH INDUSTRIES. SINCE THE SUPREME SOVIET PASSED THE "INDIVIDUAL ENTERPRISE" LAW, ALLOWING SUCH ACTIVITY FOR THE FIRST TIME IN SEVEN DECADES, MORE THAN 1.5 MILLION PRIVATE ENTERPRISES IN 50 SPECIFIED CATEGORIES ARE IN PLACE TODAY. SIGNIFICANT AMONG THESE IS THE SHIFT FROM ENORMOUS STATE FARMS AND COLLECTIVES TO SMALLER LEASEHOLD UNITS. PRESIDENT GORBACHEV, AS MANY OF YOU MAY KNOW, IS PUSHING FOR THIS LEASEHOLD -- OR ARENDA -- SYSTEM TO COVER ALL OF AGRICULTURE.

IN 1989, THE SOVIET CENTRAL COMMITTEE RECOGNIZED THE RIGHT TO LEASE FARMS FOR LIFE AND TO PASS THESE LEASES DOWN TO CHILDREN. NOT UNLIKE WHAT IS HAPPENING WITH THE RAIL SYSTEMS, THE LESSEES WILL SHARE IN PROFIT AND EVEN CHOOSE THEIR OWN CROPS.

COLLECTIVE FARMS SHOWED PER-ACRE PRODUCTIVITY AT ABOUT A NINTH OF THAT ON A SIMILAR AMERICAN FARM.

AND NOW, THE SOVIET PEOPLE ARE LOOKING TOWARD PERSONAL INVOLVEMENT, PERSONAL PROFIT MOTIVATION, AND EVENTUAL INCREASED PRODUCTIVITY. FAMILY FARMING FOR FAMILY GAIN.



OF COURSE, WE CANNOT WAX TOO IDEALISTIC ABOUT THESE CHANGES. ACCORDING TO MOST EXPERTS, ULTIMATE GAINS WILL BE A LONG TIME COMING. WE READ THAT, DESPITE RECORD CROPS IN SOME COMMODITIES, ESPECIALLY GRAIN, DOMESTIC DISTRIBUTION IS HAMPERED BY STORAGE AND TRANSPORTATION INFRASTRUCTURES THAT CANNOT SUPPORT IT. LABOR SHORTAGES, MACHINERY BREAKDOWNS, SPILLAGE AND SPOILAGE HAVE RESULTED IN LOSSES OF ALMOST ONE THIRD OF THE PRESENT HARVEST. AND EVEN THOUGH THE FARMERS ARE ALLOWED, BY LAW, TO SIGN CONTRACTS WITH PRODUCE BUYERS, THESE CONTRACTS DO NOT DEAL DIRECTLY WITH TRANSPORT AND STORAGE. EQUIPMENT NEEDS REPAIR. STORAGE SPACE NEEDS TO BE FOUND.

AND, INEVITABLY, INFRASTRUCTURE MUST BE REFINED TO MAKE THE TRANSITION FROM COLLECTIVISM TO LEASEHOLD.

IN THE FACE OF THESE CHALLENGES, THE RAIL ASSOCIATION CONTINUES TO UPGRADE LANDBRIDGE LINKS BETWEEN EAST AND WEST AND TO REMOTE INLAND POINTS. IN ADDITION, A 1989 DECREE MANDATED SUBSTANTIAL INCREASES IN AGRICULTURAL INVESTMENT FOR THE 1991-1995 PERIOD, WITH PARTICULAR EMPHASIS ON ROAD BUILDING. COUPLED WITH A MORE EFFICIENT RAIL SYSTEM, IMPROVED ROADS WILL EFFECTIVELY CONNECT AGRICULTURAL PRODUCTS -- BOTH IMPORTED AND DOMESTIC WITH SOVIET CONSUMERS IN ALL REGIONS OF THE COUNTRY.

THIS GOAL OF SMOOTH TRANSIT AND EFFICIENT DISTRIBUTION REQUIRES TREMENDOUS EFFORT ON THE PART OF ALL THOSE INVOLVED.

EARLIER, I MENTIONED A NEW OPENNESS ON THE PART OF THE SOVIETS, A WILLINGNESS TO SHARE PROBLEMS AND TO EXPLORE SOLUTIONS WITH NEW PARTNERS.

A CRITICAL PART OF THIS SHARING HAS INVOLVED BILATERAL VISITS BETWEEN SOVIET TRANSPORTATION OFFICIALS AND REPRESENTATIVES OF SEA-LAND. LAST SPRING, A JOINT STUDY TEAM OF SEA-LAND AND SOVIET TRANSPORTATION PERSONNEL BEGAN DEVELOPING THE RECOMMENDATIONS FOR RAIL IMPROVEMENT. WE VISITED THERE AND A SOVIET RAIL DELEGATION CAME TO THE UNITED STATES TO OBSERVE OUR COMPANY'S GLOBAL NETWORK CAPABILITIES, TRANSPORTATION OPERATIONS AND THE INTERMODAL FACILITIES OFFERED BY OUR AFFILIATED CSX CORPORATION COMPANIES. OUR OWN CEO, ALEX MANDL, JOINED 14 OTHER U.S. COMPANY LEADERS WHO MADE UP A PRESIDENTIAL BUSINESS DEVELOPMENT MISSION TO THE USSR.

THROUGHOUT THESE MEETINGS, WE HAVE WORKED OUT THE RAIL AGREEMENTS.



WE HAVE ALSO SIGNED A PROTOCOL TO CREATE A SEA-AIR SERVICE, UTILIZING THE SOVIET AIRLINE AEROFLOT, TO MOVE TIME-SENSITIVE CARGO BETWEEN ASIA AND EUROPE IN ONLY A WEEK, SIGNIFICANTLY IMPROVING ON THE PRESENT 15-DAY SPAN WITH COMPETING SEA-AIR ARRANGEMENTS VIA NORTH AMERICA.

IN MOSCOW, WE HAVE FORMED AN AGENCY AGREEMENT WITH SOVMORTTRANS, A SOVIET-BASED JOINT VENTURE COMPANY, TO MAINTAIN COMMUNICATIONS WITH PROPER CHANNELS AND TO HANDLE CUSTOMER NEEDS RELATING TO OUR LINER SERVICE.

OUR REPRESENTATIVE THERE, RICH NICHOLSON, SPEAKS FLUENT RUSSIAN. WE ALSO ARE ADDING PERSONNEL IN MOSCOW, BREST AND THE SOVIET FAR EAST TO OVERSEE TRANS-SIBERIAN EXPRESS RAIL SERVICE FOR SEA-LAND AND OTHER CUSTOMERS.

WE ARE DESIGNING BOOKING AND TRACKING SOFTWARE SPECIFICALLY FOR THIS RAIL SERVICE, MAKING IT POSSIBLE TO TRANSMIT TRACKING INFORMATION, VIA SATELLITE, BETWEEN MOSCOW AND OUR NEW JERSEY COMPUTER CENTER. BY ENHANCING THE DATA AND SENDING IT TO CUSTOMERS IN ASIA AND EUROPE -- AND THROUGHOUT THE SEA-LAND SYSTEM -- THEY WILL BE ABLE TO RESERVE SPACE, TRACE CARGO AND CONFIRM DELIVERY.

WE RECENTLY ANNOUNCED A CONNECTING CARRIER AGREEMENT WITH BALTIC SHIPPING, BASED IN LENINGRAD, FOR USE OF SPACE ABOARD VESSELS BETWEEN THAT PORT AND NORTH EUROPE. AND OUR AGREEMENT WITH BLACK SEA SHIPPING OF ODESSA PROVIDES SPACE BETWEEN THAT PORT AND FOS-SUR-MER, FRANCE.

WITH THOSE AGREEMENTS IN PLACE, SEA-LAND NOW OFFERS A WEEKLY SERVICE FOR CARGO SHIPMENTS BETWEEN THE UNITED STATES AND THE SOVIET UNION.

WE ARE EXPLORING JOINT VENTURES FOR SOVIET CONTAINER MANUFACTURE FOR EXPORT AND DOMESTIC USE.

AND WE ARE LOOKING INTO ARRANGEMENTS THAT WILL CALL UPON OUR GLOBAL DISTRIBUTION CAPABILITIES TO HELP SOVIET UNION FARMERS, MANUFACTURERS AND OTHER ENTREPRENEURS MOVE PRODUCTS FROM ORIGIN TO DESTINATION -- ALONG DOMESTIC ROUTES -- IN A COST-EFFICIENT AND TIME-EFFICIENT MANNER.

IT IS NOT UNLIKELY THAT, IN THE FUTURE, WE COULD INTRODUCE DIRECT SEA-LAND LINER SERVICE TO THE SOVIET UNION.

SO WE SEE A COUNTRY FORMERLY SEPARATED FROM THE REST OF THE COMMERCIAL WORLD BY POLITICAL BARRIERS. IT IS A COUNTRY TRYING TO MELD ITS EMERGING ENTREPRENEURISM INTO A FAST-MOVING GLOBAL MARKETPLACE.

IT IS A COUNTRY WITH ADMITTED GAPS IN TRANSPORTATION AND DISTRIBUTION.

BUT THE POTENTIAL IS THERE TO CREATE ONE OF THE MOST EXCITING SYSTEMS OF INTERNATIONAL, INTERMODAL TRANSIT. AND, IN REFINING THE HARDWARE, THE ROUTING, THE ELECTRONIC DATA INTERCHANGE AND THE GENERAL SYSTEM OF CARGO MOVEMENT THROUGHOUT THE SOVIET UNION, THAT COUNTRY CAN'T HELP BUT RECEIVE A CORRESPONDING BOOST TO ALL OTHER ENTERPRISES THAT RELY ON THIS INFRASTRUCTURE.

SEA-LAND IS COMMITTED TO HELPING THE SOVIET UNION DEVELOP A WORLD-CLASS TRANSPORT SYSTEM -- ONE THAT WILL BRING TO THEM -- AND TO US -- A ROSTER OF CUSTOMERS WHO RECOGNIZE THE VALUE OF THAT SYSTEM.

AGAIN, THANK YOU FOR INVITING ME TO SPEAK TO YOU HERE TODAY.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture

Washington, D.C. 20250-3900



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## SOVIET AGRICULTURE SYSTEM

To comprehend the Soviet Agriculture system, you must have some insight into the two facets which shape its existence.

- a) The political system and the "funding system" which it supports and
- b) Reality of farm production.

The McDonald's story involves both of these.

First, let us examine the recent changes and the subsequent political situation. In 1985, by decree of the Supreme Soviet of the USSR, the All Union Ministries were abolished and in their place, GOSAGROPROM, the state agricultural, industrial committee of the USSR was formed. That organization has since been abolished as well as the republic, regional and local departments.

In March 1989 the plenary meeting of the CPSU central committee worked out a course of radical reconstruction. They replaced existing administrative bodies who gave obligatory directives and established organizations from the rank and file with directions based on "economic principals". The key to success as they saw it laid in the regional APK's. Their main task is to fulfill state orders.

These "funds" fall into three categories:

ALL UNION FUND: This is the pool of goods to support the Ministry of Home Affairs, state security, the army, specific consumers, the cities of Moscow, Leningrad and other Republics which can not produce that item.

REGIONAL FUNDS: The republic governments have responsibility for distribution

LOCAL USE: The local (regional) authorities have responsibility for distribution.

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Table No. 1 Regional Agricultural Supply Locations

RUSSIAN FEDERATION: Meat, Milk, Potatoes, Fruits and Vegetables,  
Grains (Forage and Food)

UKRAINE: Meat, Milk, Sugar, Vegetable Oil, Fruits  
and Vegetables, Grains (Forage and Food)

BUELORUSSIA / LITHUANIA / LATVIA / ESTONIA:

Meat, Milk, Eggs, Potatoes

UZBEKISTAN / TADJIKISTAN / TURKMENIA:

Cotton, Livestock and Plant Breeding,  
Melons and Gourds, Vegetables and Grapes.

KAZAKHSTAN: Grain, Cotton, Meat, Milk, Fruits

GEORGIA: Tea Leaves, Subtropic Fruits, Grapes,  
Vegetables, Potatoes

AZERBAIDJAN: Cotton, Livestock Breeding, Grapes,  
Vegetables, Vegetable Oil, Sugar

KIRGUIZIA: Vegetables, Fruits, Berries, Melons and  
Gourds, Livestock Breeding

ARMENIA: Potatoes, Fruit, Grapes

MOLDOVA: Fruits, Berries, Grapes, Vegetable Oil,  
Sugar, Meat Products

Agricultural enterprises after fulfillment of these assumed obligations can realize profit from the extra food and raw material as they think best.

Table # 1 represents the responsibilities of each republic to the all union fund and table #2 is a % breakdown of the listed items supplied by each republic.



Table # 2

## MAIN AGRICULTURAL PRODUCTS (BY REPUBLIC)

1985 - 1989, %

	GROSS Product	GRAIN	COTTON	SUGAR -BEET	SUN- FLOWER	FLAX FIERE	PO- TA- TO	VEGE- TABLES	FRUIT, BERRY	GRAPE	MEAT	MILK	EGGS	WOOL	TEA LEAVES
RUSSIA	46,2	54,8	-	32,7	46,8	40,2	49,0	41,5	26,7	12,0	49,9	51,5	57,8	48,3	1,3
UKRAINE	23,3	21,8	-	57,5	46,0	27,8	25,5	25,2	31,1	12,8	22,7	23,1	21,5	6,1	-
BUELOUSSIA	5,4	3,4	-	1,8	-	26,7	14,8	3,0	5,7	-	5,8	6,7	4,4	0,2	-
UZBEKISTAN	4,8	1,4	62,9	-	-	-	0,4	8,6	7,5	8,6	2,3	2,6	2,4	5,3	-
KAZAKHSTAN	6,7	11,8	3,3	2,4	1,9	-	2,5	4,0	2,2	2,1	7,1	4,9	4,9	22,7	-
GEORGIA	1,6	0,3	-	0,2	0,2	-	0,5	2,0	6,3	11,1	0,9	0,7	1,0	1,3	93,8
AZERBAIDJAN	1,6	0,7	9,5	-	-	-	0,2	3,0	3,0	25,9	1,0	0,9	1,2	2,4	4,9
LITHUENIA	2,1	1,6	-	1,2	-	4,0	2,5	1,3	1,8	-	2,8	2,9	1,4	0,1	-
MOLDOVA	2,3	1,4	-	3,1	5,1	-	0,5	4,5	8,2	19,3	1,6	1,3	1,3	0,6	-
LATVIA	1,3	0,9	-	0,5	-	1,0	1,9	0,8	0,9	-	2,0	1,9	1,1	0,1	-
KIRGUIZIA	1,2	0,7	0,9	0,4	-	-	0,4	1,5	1,7	0,9	1,0	0,7	0,6	7,6	-
TADJIKISTAN	1,1	0,2	10,1	-	-	-	0,2	1,4	2,4	2,6	0,6	0,6	0,5	1,1	-
AREMENIA	0,6	0,2	-	0,2	-	-	0,4	1,8	1,8	3,6	0,6	0,6	0,7	1,0	-
TURKMEANIA	0,9	0,2	13,3	-	-	-	-	1,0	0,3	1,1	0,5	0,3	0,4	3,1	-
ESTONIA	0,9	0,6	-	-	-	0,3	1,2	0,4	0,4	-	1,2	1,3	0,8	0,3	-

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### G R A I N:

The total requirement is determined by the Council of Ministers and approved by the Supreme Soviet. The state order is then sent through the Republic Council of Ministers to APK's and Ministry of Bread Production. These in turn make agreements with farms who must sell to elevators and storages at approved prices. The order consists of both food (bread) grain and for forage. Food flour prices at the retail and wholesale end are fixed except for Co-ops which buy at "free market prices".

Insufficient volume of grain production starting in the late 50's resulted in imports which increased sharply from 1973, peaking in the mid 80's. The % of imported grain, to the amount used, exceeded 20%, with more than 60% of the imported grains being used in bakery production.

From graph # 1, you can see the gap between production and consumption is decreasing and this trend should continue especially if the USSR gets assistance to purchase the necessary farm equipment. The 13 th five year plan (1991-1995) calls for a stable volume of grain supply.

From Table # 3, you can see the US exports to the USSR is decreasing and there has been a shift to the purchase of lower protein wheats such as soft white. Senior Soviet grain trade officials have warned the United States they could lose their place in the grain trade with the USSR if it fails to compete with other world exporters by granting credits.

The 1970's official version was that imported grains were mostly for livestock raising. While this does not appear to be entirely true, it is very evident that large cattle and bird complexes are generally short of feed. Without continued imports, it does not seem likely they can significantly increase cattle stocks.

# U.S.S.R. WHEAT SITUATION

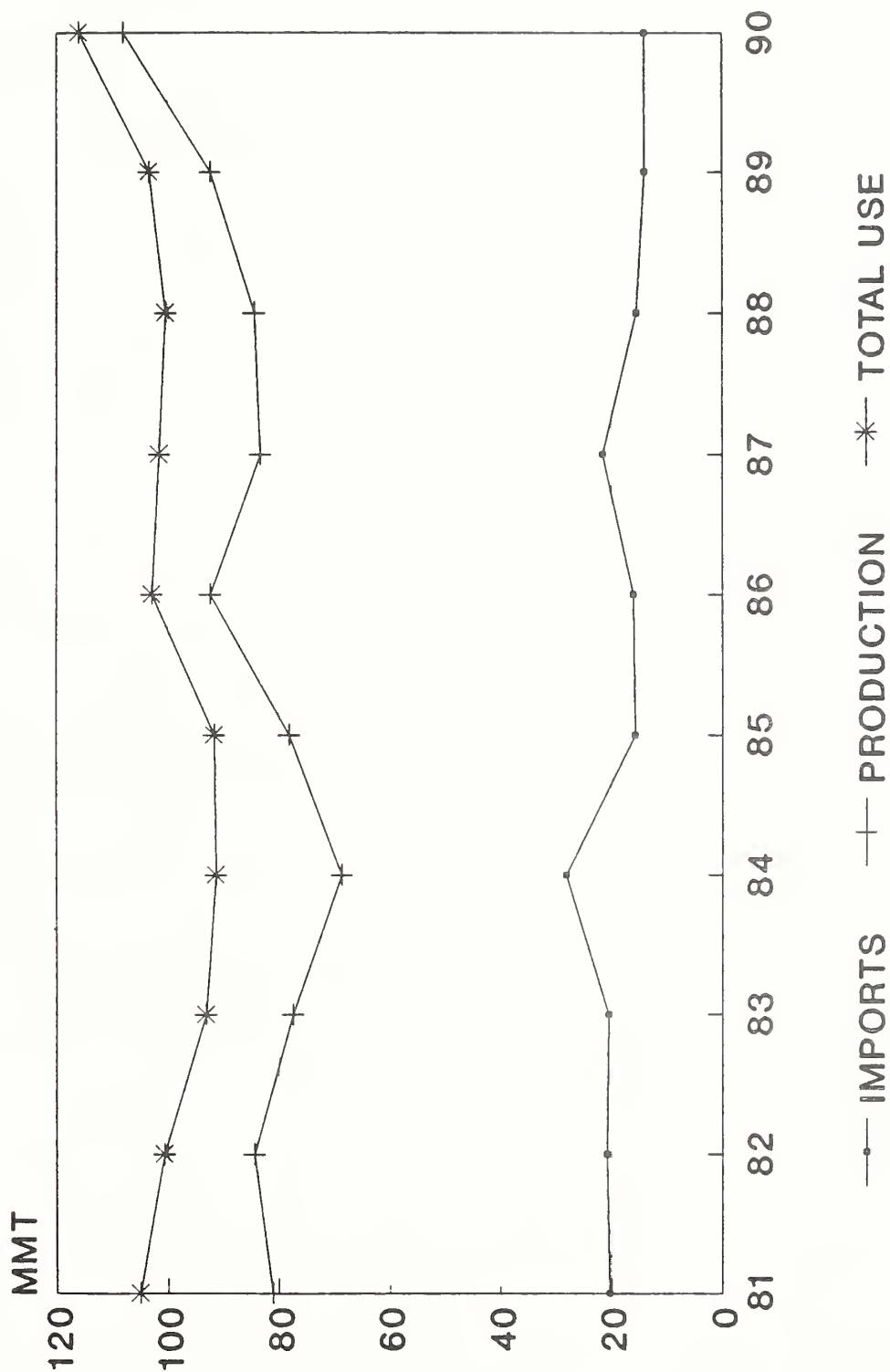


Table # 3

# U.S. WHEAT EXPORTS

## LARGEST CUSTOMERS

	1990 RANK	EXPORTS	1989 RANK	EXPORTS
CHINA	1	5,549.7	1	8,093.9
USSR	2	4,312.6	2	4,958.6
JAPAN	3	3,308.1	4	2,860.6
EGYPT	4	2,938.6	3	2,981.3
KOREA	5	1,739.3	6	1,798.4
ALGERIA	6	1,451.1	9	1,132.1
PAKISTAN	7	1,290.0	7	1,613.1
IRAQ	8	1,284.7	14	678.5
PHILIPPINES	9	902.2	8	1,173.3
TAIWAN	10	740.8	13	831.3



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### **Dairy:**

Milk is purchased at agreed prices by the dairy plants. As in the past, the state agro-industrial committee defines the volume of the inter republican dairy deliveries and the state planning committee defines the volume of import. The main consumers of the imported dairy products are Leningrad, Moscow and the southern republics. It is unlikely that the situation will change significantly over the next few years as long as there is a wide availability of cheap exports from Europe.

### **Potatoes and Vegetables:**

As with other food items the national plan is approved by the USSR Supreme Soviet and distributed through the various channels. Maximum purchase prices are pre-established. The local councils can make retail prices lower but the difference must be refunded from the local budgets.

### **Finished Products i.e. Oil, Margarine:**

In the beginning of the year, processing plants make agreements with buyers for the entire production. There are always more buyers than producers.

But, to truly evaluate the Soviet Agricultural system you must look at the APK's and even further to the Sovkoz and Kolkoz. In general they have difficulty to meet their fund obligations and their own needs. A large percentage is spoiled in storage and this makes even less product available during off seasons.



In general, APK's were in the position of trying to supply all their needs. This puts a large strain on the machinery available and does not properly utilize farm labour and management. The step toward allowing each APK to decide itself what crops to grow is a forward step but will result in even further increasing shortages.

The present situation is further complicated by each republic declaring itself independant, with republic law superceeding that of state laws. The example of trying to stop all agricultural product leaving the republic through high taxes or physical restraints has been the result. It resulted in hoarding and panic buying which further aggravated the situation.

How has McDonald's learned to supply itself with high quality Soviet raw material? We operate at several distinct levels.

For items such as flour and sugar which are 100% allocated items we have obtained allocation from the highest authority available. Our inventory levels tend to be high to cover the minor delays expected in supply.

For agricultural items such as cucumbers and lettuce, we pick those farms which have previously demonstrated their expertise in growing those items. Working together with them, we supply seed, additional technological assistance and where necessary may finance capital investment such as growing lights or pickling facilities which would allow them to have more year round income. Contracts with them are specific and tie up all production if it meets quality standards.

For items such as strawberries, we contract far in advance. The Kolkoz knows that product is sold if it meets our quality standards and can then convert from less profitable crops. We may also pay higher than state price to ensure quality. This also allows the farm to purchase other necessary food items they can not supply themselves.

For apples, and onions we go to the southern republics and work during harvest to select our needs. The entire crop is then moved as quickly as possible to our own storages. Again for quality, we may pay slightly above existing prices.

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For meat, we obtain our choice by paying the free market price and selecting only those carcasses which meet our exacting standards. We are helping here as we are feeding the Moscow citizen and providing a substantial increase in profit for the slaughterhouse to upgrade its facility.

In obtaining potatoes we have supported those areas which grow potatoes for US. The various farms received the highest quality seed and a substantial amount of agricultural equipment to help from planting to harvest. This was available to be used on their own fields as well. The increased productivity is intended to allow them to meet their state obligations and still have land available to grow our potatoes.

Items such as milk must be obtained also from allocation funds but we pick up directly from the farm.

Transportation has been a true key to our success. We have a significant fleet of vehicles which allow us to pick up for ourselves. We pick up milk from the dairy farm in our own milk road tanker to be pasteurized ourselves. Carcass meat is picked up on our refrigerated, railed meat trucks. Potatoes are transported directly from the fields to our storages and our other vehicles are involved continuous picking up items and moving them directly from the manufacturer to our processing complex.

This is to a large extent unique. Most other Soviet organizations contract with an "AUTO COOP" for their transportation needs. We know the urgency of ensuring timely, reliable transport. We will even experiment with air freight for lettuce grown in the south. The rules are changing daily in the USSR. Republics do not want to send product to Moscow or Leningrad. It is a struggle to move them out of the republic borders. That is why it is crucial to obtain much needed Soviet assistance but be prepared to do as much as possible in moving those goods yourself.

Transportation from our processing facility to the highest volume McDonald's restaurant in the world is easy after the above has been done.

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# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

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## **FOOD GRAIN OUTLOOK**

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### 1990/91 to See a Swing From Tight Supplies

The U.S. and world wheat markets have changed dramatically over the last several years. The first half of the 1980s saw world wheat production consistently exceeding use and stocks rose to record levels. With the passage of the 1985 farm bill, stocks started to gradually decline as output was constrained, trade rose, and use expanded. The reduction in stocks accelerated in 1988/89 and 1989/90 as production problems arose but use continued to expand. The 1990/91 marketing year began with the lowest stocks-to-use ratio in decades both in the U.S. and globally. In a dramatic switch from the last couple of years, record foreign wheat production and a near record U.S. crop is overpowering a sizable increase in use. Thus, world and U.S. stocks are forecast to show a dramatic increase in 1990/91. While the large increase in output has led to sharply lower wheat prices, the forecast carryover supplies remain well below the mid-1980s levels.

### World Wheat Production Reaches a Record; World Trade Contracts.

World 1990/91 wheat production is forecast up 11 percent from 1989/90. Even with consumption forecast up 6 percent, world ending stocks are expected to jump 23 percent, the sharpest increase in volume since the mid-1970s. The world stocks-to-use ratio is expected to rebound from the recent drought-induced lows, but remain well below the highs of the mid-1980s.

Foreign wheat production is projected up 8 percent, with the largest gains occurring in the Soviet Union, Canada, and China. Large crops in both importing and exporting countries is leading to a forecast contraction in world trade. Export prices have plummeted since the beginning of the marketing year, but the low prices do not appear to be stimulating imports.

The Soviet Union is forecast to produce its second largest grain crop on record--235 million tons. Wheat production in 1990/91 is forecast to expand 17 percent from 1989/90 to 108 million tons. Favorable weather in most parts of both winter and spring wheat regions contributed to the record yields. While wheat area in

the Soviet Union has been falling, the decline has largely been in the lower yielding spring wheat areas.

Despite the large crop, Soviet wheat imports are forecast to reach 13 million tons, only 7 percent below 1989/90. While the crop is much greater than a year ago, the State has not been able to procure a proportionately larger share of it. Dockage and waste together are forecast at 15 percent of the total grain crop. Chronic problems worsened this year. Labor, equipment, and input shortages have created more harvest problems than usual. Transportation bottlenecks have slowed deliveries. Farmers continue to resist selling grain to the Government, preferring to keep the grain on-farm for feeding or for barter purposes.

While Soviet wheat imports (including flour) are forecast down only 1 million tons from a year earlier, they have been very slow to buy wheat. Until recent weeks, there were no significant wheat purchases in 1990/91. The Soviet Union claims that since their foreign exchange reserves are limited, they will only buy wheat if exporters provide credit. Reports indicate that Canada might have sold wheat on credit in early November. France also has arranged for 2-year credit for the equivalent of U.S. \$400 million to cover wheat and barley.

China's total grain crop is forecast to be a record, with wheat increasing 6 percent to a record 96 million tons. The Government encouraged farmers to plant more area to grain by increasing agricultural investment, raising procurement prices, and promising not to use IOUs, which have been used in the past. Favorable weather throughout the growing season boosted yields to a record.

However, the large crop is creating some procurement problems. Procurement funds are reportedly running low in some provinces. A recent Government announcement indicated that there may be some changes in the procurement system because of the pressures created by the 1990/91 large harvest. This is creating uncertainty and possibly could have a negative impact on the 1991/92 crop. Imports are forecast down 26 percent from 1989/90 to 11.5 million tons.

North Africa's imports are forecast up 4 percent to 14.6 million tons with the largest increase expected in Morocco. Since most North African countries rely heavily on credit to import wheat, exporters providing the lowest prices and the best credit terms will have the advantage. As a result, North Africa continues to be the market most contested by the United States and the EC.

Middle Eastern imports are forecast down 36 percent mainly because of improved crops in Turkey and the U.N. sponsored general embargo on trade with Iraq.

South Asian 1990/91 imports are forecast down sharply from

1989/90. The third consecutive good monsoon has ensured large food grain supplies in India and only limited import expansion in Bangladesh and Pakistan. India wants to earn badly needed foreign exchange by exporting wheat. However, with world wheat export prices down sharply and world trade stagnant, India likely will not be able to export as much as they would like. Imports are forecast up in East Asia, primarily because South Korea is importing more wheat for feed.

Latin American 1990/91 imports are forecast to increase more than a third, with Brazil accounting for much of the gain. Brazil's wheat crop is forecast down nearly one third. Consumption continues to outpace production as bread subsidies remain in place. Imports are forecast to more than double from 1989/90 to 3.3 million tons. Mexico's imports are also forecast up sharply.

#### Competition Intensifies as World Wheat Market Tightens.

Excellent crops have increased exporter supplies. With world trade expected to decline in 1990/91, competitor stocks will increase sharply from 1989/90. As a result, world wheat prices have fallen as competition for the limited market has increased.

Canada is forecast to harvest 31 million tons (including durum), the second highest on record and 27 percent above 1989/90. Two years of relatively high prices led to a 3 percent area increase and favorable weather boosted yields to a record. Although lower durum prices resulted in reduced area planted, excellent yields lifted durum production to a forecast record 4.3 million tons.

Despite abundant supplies, lower Soviet and Chinese imports, two major Canadian markets, are likely to keep Canadian exports from expanding to more than a forecast 18 million tons, 6 percent more than in 1989/90. As a result, ending stocks are projected to more than double in 1990/91, the sharpest year-to-year increase in volume ever.

While dry weather cut production in southern Europe, EC production also benefitted from favorable weather in the north throughout most of the growing season. Dry weather in the summer appeared to raise protein levels particularly in the United Kingdom, without greatly curtailing yields. EC wheat production is forecast to be the second highest on record at 81 million tons, 3 percent above 1989/90.

However, the large crop is creating a large surplus within the EC. In an attempt to minimize stocks, the EC aggressively marketed wheat early in the season. Export restitutions have nearly doubled since January to an average of \$144 per ton in October. In some cases, the restitutions were nearly twice the export price, and they are now the highest since January 1988. Total EC exports are forecast at 20.5 million tons, slightly below 1989/90 as slack world imports and intense competition limit EC export potential.



Strong production and limited export growth is pressuring EC stocks up. In addition, West Germany's intervention stocks expanded when East German wheat entered prior to reunification.

The Southern Hemisphere wheat harvest began in November. Argentina has experienced favorable weather during much of the growing season. Area is forecast up 10 percent from 1989/90 despite the economic uncertainties that farmers faced at planting. Argentine exports are forecast up 13 percent from 1989/90 to 6.8 million tons.

Australia's wheat is just beginning to be harvested. Exports are forecast at 10.5 million tons, 3 percent below 1989/90. Other exporting countries, such as Turkey and Saudi Arabia, are likely to have increased supplies to export in 1990/91.

### U.S. Exports Fall as Competition Intensifies

U.S. exports in 1990/91 are forecast down 13 percent because of strong competition and the stagnant trade situation.

U.S. exports are forecast to be the lowest since 1986/87. Intense competition, the decline in Soviet and Chinese imports, and the U.N. endorsed general trade embargo on Iraq are all contributing to sluggish U.S. sales. As of November 8, the Export Sales Report indicated that U.S. outstanding sales and accumulated exports (June/May) had fallen, despite a pick-up in Export Enhancement Program (EEP) initiatives, sales, and bonuses.

Larger global supplies and fierce competition have contributed to increased EEP sales in the first five months of the 1990/91 marketing year (June/May). EEP wheat sales are up 67 percent from the same period in 1989/90. (EEP sales were very slow and bonuses were low the first half of 1989/90). The Soviet Union has not yet purchased U.S. wheat in 1990/91. China's accumulated exports and outstanding sales as of November 8 were 31 percent below those reported at the same time a year earlier.

Exports to Egypt and Morocco are less than half that of the June-October 1989. Much of the North African sales that have been made are under the EEP and P.L. 480.

As of November 8, EEP sales to the Philippines, 1990/91 were almost twice 1989/90 sales, helping the U.S. regain market share. Last year, Canada expanded its wheat exports to this largely U.S. market.

The EEP will continue to play a major role in promoting U.S. wheat in 1990/91. Increased EEP sales have been accompanied by higher bonuses in 1990/91. EEP bonuses for wheat averaged \$29 per ton between June 1 and November 8th compared to \$9.50 per ton for the same period a year ago. However, they have risen sharply, averaging over \$40 per ton in September/October.



GSM credit guarantees will also play a critical role, with the top recipients for GSM-102 being South Korea, Mexico, and Ecuador, while Morocco heading GSM-103 allocations. As of October 17th, Public Law (PL) 480 Title I/III FY 1991 allocations reached \$2.8 million compared to an initial allocation of \$1.6 million for FY 1990. Larger supplies and lower prices compared to 1989/90 assure greater wheat availability for P.L. 480 programs.

#### Record Feed and Residual Forecast in 1990/91

Feed and residual wheat disappearance is forecast to reach 450 million bushels, almost triple the 160 million in 1989/90. Wheat prices have been low enough to make feeding wheat attractive, especially where transportation costs make coarse grains expensive, as in the Southern Plains, or anywhere low quality wheat is discounted. For example, in Texas during September the average farm price for wheat was \$2.33 bu. (3.88 cents per pound) while it was \$2.47 bu. (4.41 cents per pound) for corn. This is particularly impressive because by September the Texas corn harvest is beginning. Normally, wheat is more likely to be priced competitive with corn during the summer, right after the winter wheat harvest, but before the corn harvest. This year, however, wheat continues to be favorably priced in some locations.

The first quarter feed and residual disappearance of 419 million bushels is the largest on record. Low wheat prices are forecast to encourage some continued feeding this fall, and possibly in the last 6 months of the marketing year. However, in most years since the Stocks Report survey was shifted to September 1, the second quarter (September-November) has showed negative feed and residual disappearance. This tendency of the second quarter residual to be negative explains why the annual 1990/91 forecast (450 million bu.) is only slightly above the first quarter estimate (419 million).

Wheat mill grind and U.S. flour production were a record in August, pacing first quarter food use to a preliminary 197 million bushels, up almost 8 percent from a year-earlier. Food use for the full 1990/91 year is forecast up 2 percent, to 745 million bushels, increasing at more than double the rate of population growth.

#### U.S. SUPPLY OUTSTRIPS USE

Near record wheat production in 1990 more than offset lower beginning stocks, pushing total supply up 20 percent. Meanwhile export demand has slumped, but lower prices are moving wheat into feed channels.

#### Record Yields Pace U.S. Production

Wheat production in 1990 was 2.74 billion bushels, nearly

matching the record 2.79 billion produced in 1981, and up 35 percent from 1989. Planted area increased only slightly from the previous year, but an unusually high 90 percent of planted area was harvested for grain. The low 5-percent ARP, with the option of harvesting up to 105 percent of base (at the expense of reduced deficiency payments), prospects for good yields, and hopes for high wheat prices, induced farmers to harvest an unusually high portion of planted area.

Yields reached a new record, despite less than ideal weather. The late fall was unfavorably dry in the Southern Plains, and December brought some severe cold, but January and February were mild. The spring floods damaged some wheat, but June harvest weather was favorable. The previous record yield was in 1983/84, when the PIK program paid farmers not to harvest a portion of their planted area. Since farmers chose not to harvest their lowest yielding acres, this biased yields up in 1983.

It is possible that several years of unfavorable weather had masked the genetic improvements wheat breeders have achieved, so that record yields occurred despite weather conditions. Weather for the 1990 crop was a somewhat typical mix of good and bad.

#### Beginning Stocks Ready to Move to Market

On June 1, 1990, wheat stocks were 536 million bushels, down 24 percent from a year earlier. However, the entire decline was in wheat owned by the government or in the FOR. Free stocks actually increased 50 million bushels to 275 million. The free stocks of wheat at the beginning of the year added to the supply of wheat readily available for marketing during harvest. However, with the large production, the stocks added to supplies instead of cushioning any production shortfall.

#### Supply Increase Dwarfs Greater Use

Total supply in 1990/91 is estimated at 3.3 billion bushels, up 541 million bushels from a year earlier. Meanwhile total use is forecast up 133 million bushels. Production is estimated almost 400 million bushels greater than forecast total use, leading directly to increased stocks. Moreover the disposition of those stocks at the end of 1990/91 is not clear because of a number of decisions that have yet to be made by the Secretary. The decisions of the Secretary of Agriculture concerning the FOR in 1990/91 are due by December 15, 1990.

#### World 1991/92 Planting Prospects

It is still too early to forecast wheat production for 1991/92. However, large 1990/91 crops, prospects for a significant build-up in wheat stocks, and sharply lower export prices are likely to discourage producers in some countries from planting wheat in 1991/92. However, farmers in several major producing countries, including the EC, the Soviet Union, and China are not very

responsive to world price movements. While producers in Canada, Argentina, and Australia are normally more responsive, much depends on relative prices of other commodities.

Good autumn rains and mild weather point to favorable planting conditions for winter wheat in Northern Europe, Spain, and Portugal, and most winter wheat areas of the Soviet Union. Concerns continue about dryness in a belt ranging from southern France east through the Balkans. Rain in recent weeks has helped, but because of the extended dry period, timely precipitation will be needed throughout southern Europe.

While world prices are sharply lower, the direct impact on EC is minimal due to the support system provided by the EC's Common Agricultural Policy (CAP). CAP policies regarding different crops do vary, affecting relative prices, and farmers' costs and returns. For example, the 1990/91 support price for oilseeds was cut sharply. Thus, there is an incentive for producers to plant wheat instead of oilseeds.

In addition, unlike the last two years, the total EC grain crop is not expected to exceed the Maximum Guaranteed Quantity (MGQ) of 160 million tons (the 1990/91 corn crop is forecast down). Therefore, EC farmers will likely not have to pay an additional coresponsibility levy on their 1990/91 grain, or see the automatic reduction in the basic support level for 1991/92. Thus, despite the expected build-up in EC wheat stocks in 1990/91, more area could be planted to wheat in 1991/92.

In the Soviet Union, winter wheat area has stabilized and yields have been increasing. Improved farming practices, particularly increased fertilizer use, have been adopted. Generally, adequate moisture and mild temperatures have provided favorable conditions for the emergence and establishment of the 1990/91 winter grain crop, although excessive October rains in some regions delayed sowing. As of October 29th, 33.4 million hectares had been sown to winter grains, approximately 4 million fewer than last year.

Early season winter wheat planting conditions in China were favorable. Government policies continued to favor grain cultivation over non-grain commercial crops, which likely will keep area from falling significantly. However dry weather with above average temperatures in early autumn slowed development until October rains improved the situation. In addition, recent changes in procurement policy possibly could have a negative impact on the 1991/92 crop.

#### **Lower U.S. Wheat Output Expected in 1991**

U.S. wheat prospects for 1991 point to decidedly lower production than the near-record 1990 crop. Area will be reduced, and there is no assurance that the 1990 record yield will be replicated. However, 1991/92 U.S. wheat supplies will be bolstered by the much larger carryin stocks.



A higher ARP level and prospects for stronger prices for alternative crops will assure sharply reduced wheat seedings for the 1991 wheat crop. Assuming the minimum ARP level of 15 percent for 1991, a participation rate similar to this year likely would lead to four to five times more wheat area idled under the ARP in 1991 than the approximately 2 million acres in 1990.

The tentative 15 percent 1991 ARP was announced before the 1990 farm legislation became law in order to give winter wheat producers some guidance in making planting decisions. The ARP is a major shift from 1990, which featured a 5 percent ARP with the option to modify contracts, accept reduced deficiency payments, and harvest up to 105 percent of wheat base.

Lower prices for wheat relative to alternative crops will also contribute to the expected drop in U.S. wheat area, and not just by those producers who do not choose to participate in the 1991 program. The various provisions of the new legislation will mean that even participating producers will plant a portion of their permitted acres to other crops. For 1991, the major impact of these provisions on participants is expected to be on spring wheat plantings.

No additional CRP sign ups have occurred, so effective base is likely to remain about 80-81 million acres in 1991. The 4.8 million acres in the 0/92 program in 1990 was unusually high. Planting minor oilseeds on 0/92 wheat land in 1991 likely will be attractive, but some of the land under 0/92 in 1990 probably will be used to satisfy the expanded ARP requirements in 1991.

Flexibility provisions of the 1990 legislation are likely to also reduce wheat area, especially for HRS, where farm prices have been particularly low compared to alternative crops. In 1990, an estimated 11.7 million acres were planted to HRS, of which 1-2 million acres probably will be planted to other crops under flexibility provisions.

Nonparticipants in government programs do respond to market prices. In many Soft Red Winter (SRW) areas, program participation is traditionally lower than in other regions. In 1980 and 1981, SRW producers expanded area in response to high wheat prices, just as they have in response to 1988 and 1989 prices. Between 1983 and 1985 SRW producers responded to lower wheat prices by planting less wheat, even though the wheat program did not have as much flexibility as the current program.

Harvested wheat area is likely to decline more than planted area for 1991. The low ARP, good prospective yields, and optimism about prices led farmers to harvest an unusually large portion of the planted area in 1990. In parts of the Southern Plains it is common to plant wheat in excess of permitted acres, with the excess used for pasture. However, the producers clip the excess to meet USDA requirements in time to certify to the local ASC



office that they are in compliance with the program requirements.

Producers planting 1991 crop wheat in 1990 (mostly winter wheat producers) have the option of reducing deficiency payment acres 15 percent of base under normal flexible acres, or receiving a likely lower deficiency payment rate (using a 12-month season average price instead of the 5-month price). Most winter wheat farmers are likely to choose the lower payment rate. However, the flexibility provisions could have an impact on some winter wheat producers' harvested acres depending on winter wheat yield prospects and market conditions, such as cattle prices and prices of spring planted crops.

#### Examination of Relative Cost and Returns

New legislation in 1990 has increased farmers' program planting options, making farmer's production decisions more dependant on market returns and less linked to program payments. Normal Flexible Acres provisions of the Budget Reconciliation Act (except for winter wheat producers in 1991) reduce a farmer's payment acres by 15 percent of base. An additional 10 percent of base can flex under Optional Flexible acres. The crop planted on flexible base acres can be any crop other than fruits and vegetables and other crops as designated by the Secretary.

However, where normal flexible acres provisions apply, market profitability becomes an important factor determining what crop is grown. More specifically, farmers' expectations of profitability at planting time (or at the time they must be in compliance) will determine what crop is grown on flexible acres.

A basic measure of profitability per acre is:  
 $(\text{Price} * \text{Yield}) - \text{Variable Costs}$

On a per acre basis, price and yield determine revenue. Variable costs are those that can change depending on what crop is grown.

The profitability of two crops can be compared by the equation that sets the profitability equal. When the profits are the same for the two crops the farmer is economically indifferent to which is planted.

Prices over the last year have changed significantly, with wheat prices falling more than alternative crop prices. Planting wheat for harvest in 1991 seems much less attractive than it did a year ago.

Soybeans in Illinois and sunflowers in North Dakota appear much more attractive than wheat (see table and graph). Plotting the last year's farm prices on the same graph as the break-even line illustrates how much more attractive it has become to plant soybeans in Illinois. However, about a quarter of the wheat acres in Illinois were double cropped with soybeans, making the two crops, to a certain extent, compliments, not substitutes, on

a significant portion of Illinois' wheat acreage. Nonetheless, planting soybeans on flexible wheat base acres in Illinois appears to be a viable alternative. However, if the wheat is already planted, the decision is more difficult.

In North Dakota the spring wheat producers face strong incentives to plant flexible acres to alternatives to HRS. Durum wheat prices have been much stronger than HRS, making durum area less vulnerable. The preliminary October HRS price received by farmers was \$2.25 bu., not only well below the breakeven wheat price for recent sunflower seed prices, but also significantly below the breakeven wheat price associated with the sunflower seed marketing loan. The incentives to switch to sunflower appear very strong.

A comparison of corn and wheat returns in Missouri illustrates the general attractiveness of coarse grains when compared to wheat.

table 1 North Dakota Breakeven Assumptions

Variable	Sunflower	HRS	Barley
Assumed Yield	1200	33	55
Production Cost/acre	63	43	50

1991 crops

table 2 Illinois and Missouri Breakeven Assumptions

Variable	Illinois		Missouri	
	Soybeans	Wheat	Corn	Wheat
Assumed Yield	40	57	100	46
Production Cost/acre	57	67	113	60

1991 crops

In 1988, Illinois farms with wheat base had over 4 million acres of soybeans. North Dakota farms with wheat base had over 3 million acres of barley base in 1988. Missouri farms with wheat base also had 2 million acres of corn base.

#### RICE SITUATION AND OUTLOOK

##### U.S. Production Expected Up Slightly

U.S. rice production in 1990/91 is forecast at 154 million cwt, slightly below a year earlier. Output is down despite a 4.5 percent increase over 1989/90 to 2.81 million harvested acres. The area increase is mainly attributed to a change in the acreage reduction requirement that allowed producers to plant 80 percent of their base acreage in 1990 compared with 75 percent in 1989. However, the wet spring in the Delta kept plantings below what could have been grown.

Yields for 1990/91 are projected at 5,499 pounds per acre, down 3 percent from the year earlier record of 5,749 pounds per acre. Yields are forecast down in all rice-producing States except Louisiana and Texas. Wet weather hampered rice seeding in the Delta, where half of U.S. rice is grown, and forced some producers to switch to lower-yielding short season varieties. Also, heavy winds and rain slowed harvest and caused some lodging in Arkansas. By October 14 only 64 percent of the Arkansas crop was harvested compared to a 91 percent average. Also, the late harvest increased the risk of frost damage which could further reduce yields. Although Texas yields are not forecast to be down, higher yields would have been possible if second crop cuttings had not been decreased because of delays in planting and harvesting the first crop.

Total U. S. rice supply (stocks, plus production, plus imports) for 1990/91 is projected to be up slightly, but U.S. exports are forecast to fall 5 percent from 1989/90 to 73 million cwt as a result of reduced world trade and the Iraqi embargo. U.S. rice exporters are searching for find new markets in 1990/91 to replace the substantial loss incurred by the U.N. sponsored trade embargo against Iraq. Brazil's recent purchase of U.S. rough rice is currently keeping U.S. exports strong.

U.S. Government programs may be used more extensively in 1990/91. Iraq was a major destination for U.S. rice purchased through government programs in the past. However, other regions are likely to benefit from these programs. Eastern Europe, Africa, and Latin America are areas where U.S. exports are expected to increase.

Continued increases in domestic use of rice are expected to more than offset the forecast decline in U.S. exports. Consequently, total U.S. rice use is projected to increase by 2.6 million cwt to 161.8 million cwt. For the fifth straight year, U.S. production is expected to fall short of use. As a result, stocks will remain tight. An increase in imports will keep stocks from falling. For the third straight year, carryout stocks are expected to remain close to 26 million cwt and the stocks-to-use ratio at around 16 percent.

U.S. farm prices are currently forecast to range between \$6.25 and \$7.25 per cwt in 1990/91, compared with an estimated \$7.30 in 1989/90 and \$6.83 in 1988/89. Recently the nearby futures has shown an upturn reflecting the delayed harvest and tight supplies in the United States as well as purchases of U.S. rice by Brazil. Reports of lower test weights and milling rates for U.S. 1990 crop rice adds to the tightness of U.S. supplies and provides further support for U.S. prices.

#### International Rice Situation

World rice production is forecast to reach a record 345 million tons in 1990/91, slightly above 1989/90. Consumption is



projected up 3 percent and world stocks are forecast to reach a record. Foreign production is projected up, reaching a record 340 million tons. Both consumption and stocks are forecast to rise.

Abundant Asian crops and the Iraq trade embargo have reduced trade prospects for calendar year (cy) 1990 and 1991. World trade in cy 1990 is forecast at 12.1 million tons, down 19 percent from 1988/89. Trade in cy 1991 is projected up 7 percent to 12.9 million tons. Export prices have declined from the first half of cy 1990 as exporters compete for the tighter world market.

#### Good Crops Cut Asia's Rice Imports

Total Asian imports in cy 1991 are projected to decline 3 percent from cy 1990 and 46 percent from cy 1989. Favorable monsoon rains have boosted prospects for Asia's 1990/91 rice crops. Both China and India, which together account for over half of world production, are expected to harvest record crops.

Larger supplies and a change in policy which allows freer movement of rice within China has led to a sharp drop in imports from cy 1989. In cy 1989, China imported 1.4 million tons of rice. In cy 1990, China is forecast to return to its position as a net exporter, but not to the levels exported prior to 1987 when it exported close to 1 million tons annually.

The Philippines is likely to be Asia's largest importer in cy 1990, as adverse weather cut the size of the 1989/90 crop. However, crop prospects are much improved for 1990/91, although some damage was sustained during a recent typhoon. Imports are forecast to fall from 625,000 tons in cy 1990 to 250,000 in cy 1991.

The trade embargo on Iraq has limited growth prospects in the Middle East. Iraq was the world's fourth largest importer in cy 1989, accounting for 4 percent of global imports. The country was the largest market for U.S. rice in cy 1989, taking about 13 percent of U.S. rice exports. Total Iraqi imports in cy 1991 are now forecast to be cut sharply by the trade embargo.

#### Latin American Imports To Increase

World trade in cy 1990 and cy 1991 is likely to be supported by large imports by Latin American countries, particularly Brazil, Peru, and Mexico. Brazilian farmers reduced area in 1989/90 due to lack of credit, low prices, and uncertain economic conditions. In addition, the crop in major producing areas suffered from adverse weather. Peru's 1989/90 crop was severely affected by drought, as were Mexico's 1988/89 and 1989/90 crops.

#### Exporters Faced with Tighter Market



Major exporters are being hampered by strong Asian production, little market expansion, and stock accumulation prospects. Their exports will depend, in large part, on government policies adopted by Vietnam and Thailand. During the last two years, Vietnam has been aggressively marketing rice at low prices while Thailand has turned to supporting domestic farm prices and subsidizing exports. It is unclear whether these countries will continue these policies in cy 1991 or shift to new strategies.

Thailand's 1990/91 crop is forecast down 6 percent due to adverse weather and continued problems with brown planthoppers. However, Thailand's cy 1991 exports are likely to increase 10 percent to 4.3 million tons because the Government holds abundant stocks.

Vietnam is forecast to produce 11.4 million tons in 1990/91, 3 percent below 1989/90. Vietnam's reduced crop, continued logistical problems, and increased competition with other Asian exporters are expected to lead to a 15 percent reduction in Vietnam's cy 1991 exports.

#### U.S. Exporters Challenged to Find New Markets

Smaller world trade in cy 1990 is limiting U.S. exports. U.S. exports in cy 1990 are forecast at 9 percent below cy 1989. In addition, relatively tight U.S. supplies have kept export prices high relative to the Asian exporters. Calendar 1991 U.S. exports are projected up 8 percent to 2.4 million tons. This assumes that U.S. exporters are able to find new and/or expanded markets to replace much of the exports that would have gone to Iraq.

The cy 1991 export forecast also assumes that Latin American importers will turn to the United States for a large proportion of their import needs. Location, rapid delivery, and high quality give the United States an advantage over other rice exporters. However, U.S. prices will have to be competitive to make U.S. rice attractive to Peru, which has severe foreign exchange constraints, Brazil, which is in the middle of serious economic adjustment, and Mexico.

U.S. government programs will play a more important role in rice exports than they have in the last two years. On September 14th, the United States targeted Eastern Europe (Hungary, Romania, Czechoslovakia, Yugoslavia, and Poland) for 100,000 tons of rice under the Export Enhancement Program (EEP).

In addition, an increase in P.L. 480 rice allocations will help support the U.S. rice market. P.L. 480 Title I/III FY 1991 initial allocations for rice were announced in October. The initial FY 1991 allocation for rice, set at 216,000 tons, is 31 per cent higher than the initial allocation for FY 1990.

The GSM program has been very important to U.S. rice exports. However, in past years, 85 percent of GSM credit for rice has gone to Iraq. It is not yet clear how much GSM credit guarantees

for rice will be available in FY 1991, nor is it clear which countries will receive the guarantees.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91 Session #C4

Wednesday, November 28, 1990

## World Wheat Outlook 1990/91

Paul McAuliffe

World Grain Analyst - Continental Grain Company

I welcome the opportunity to address you this morning on our outlook for the wheat situation. As Jim Donald of the USDA's World Board said in his letter announcing this outlook conference, I too, hope these comments will be of some help to you in planning for the coming year.

My primary function at Continental Grain is to focus on the world's grain markets, in this case wheat, and point out the shifts in production, supply, stocks and likely direction of price adjustment needed to reflect the supply/demand imbalances. As wheat is a world grain, most of my time is consumed in following major world wide supply/demand changes and government actions that will impact the major direction of world values.

Although the United States is a major influence in the wheat market, the 1990/91 season is really best described by what happened around the world rather than just focusing on the United States. I would say that 1990 will be remembered as a year of records. In many ways, the analog year to 1990 is 1976 - another year which saw high early - season wheat prices meet a growing season without major crop problems in wheat, corn or rice.

The 1990 wheat season is now known for a near - record Soviet wheat crop on record high wheat yields; a record Chinese wheat crop on record wheat yields; a record French wheat crop; a record Canadian wheat yield per acre; a record USA wheat yield; a record EC wheat yield; a near record East European wheat crop and yield; and a record tying Indian wheat crop. The EC is forecast to see a record ending carryout. In addition, the 1990 year will be remembered for a record Soviet grain crop, a record Chinese corn crop and a record yield in the USA coarse grain crop. As if that was not enough to burden international wheat values, increased export subsidies, primarily from the EC and USA, have pushed international wheat values to very low levels... levels that are disproportionately low when compared to historic carryout stock levels.

Some of the other "records" for the 1990 wheat season are not immediately apparent until we do some analytical comparisons. Since the theme of this agricultural conference is "Agriculture in a World of Change," nothing could be more appropriate to describe wheat over the past season, and what is likely to happen to wheat in the coming season: more records of change. Other than the absolute "records" mentioned earlier with respect to crops and yields, the following may be of some interest: The United States in 1990/91, saw a record year-to-year jump in increased production, the United States will likely see a record high level of wheat feeding, and international values in the world will see a record wide spread between the price of corn vs wheat (on a FOB basis). In 1991, the United States with normal yields and abandonment will likely see another record in the year-to-year change of the USA wheat crop... this time a record year-to-year decline as US farmers follow US government signals to set aside a mandatory 15% of their wheat base, and yields fall back to normal levels from this season's record high.

The remainder of my talk will center around a series of graphic slides that visually illustrate the present 1990/91 marketing year's highlights of production, world trade, carryout stocks and exportable surplus' by the five major wheat origin's. Major origins represent about 35% of the world's wheat production but between 90-95% of the supplies for world importers. As such, these origins are either looking for a "home" for their wheat - as is the case in 1990 (a buyer's market), or are choosing their clients/prices, as was the case in the sellers' markets of 1988 and 1989.

Slides:

#### HARVESTED ACREAGE

United States vs Four Major Competitors 1970 - 1990

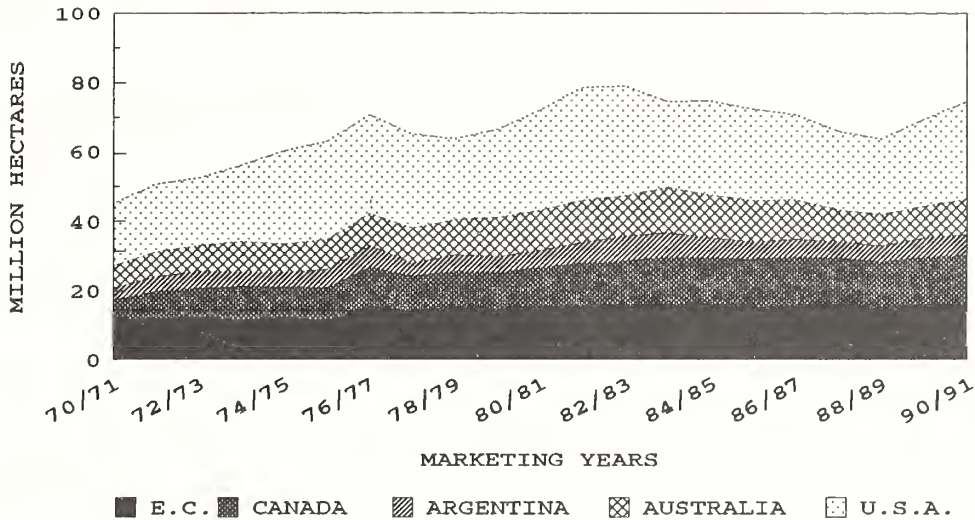
EC and Canadian acreage have historically shown the least variation, gradually trending upward since the mid 1970 price explosion in world wheat values. Argentine and Australian acreage shows a general trend to increase up until the early 1980's when acreage was diverted to livestock and wool producing activities in the case of Australia while Argentine acreage has gone to producing other crops.

USA acreage shows a generally increasing trend up until the early 1980's responding to either higher world prices, or higher target/loan rate prices. In the 1983 - 1988 era, USA acreage sees a severe decline in harvested acreage due to set aside programs, paid diversion programs, 0/92 programs and conservation reserve programs. Not until the 1989 and 1990 seasons did the USA bring much of the unused wheat acreage back into production due to low USA and low world stocks.



## HARVESTED ACREAGE

UNITED STATES vs FOUR MAJOR COMPETITORS



## MAJOR EXPORTER ACREAGE

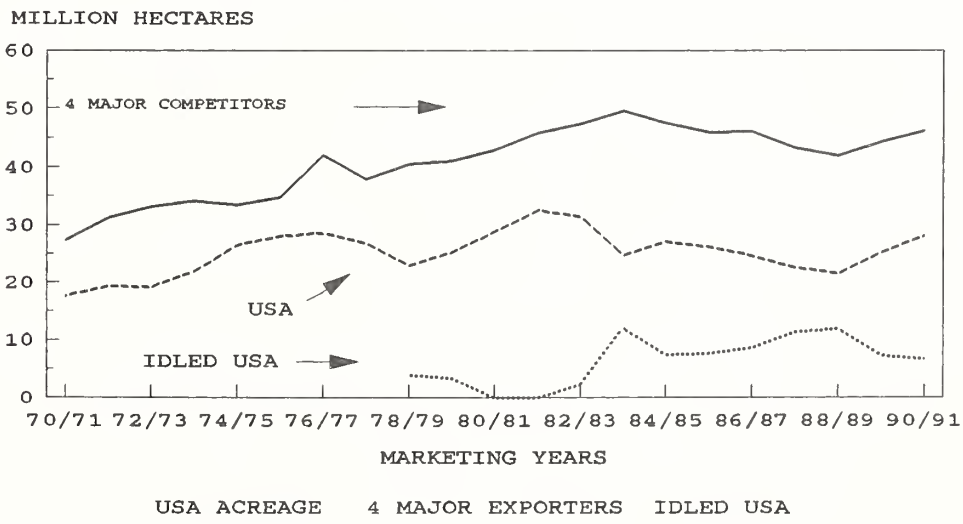
USA, 4 Major Competitors, & Idled USA wheat acreage

The next slide shows a similar acreage trend along with an estimate of the idled wheat acreage in the USA under the unpaid set aside program, 0/92 program and the conservation reserve program.

Note that the wheat acreage, both by the USA and its 4 Major competitors is below the levels reached in the early 1980's.

## MAJOR EXPORTER ACREAGE

USA, 4 MAJOR COMPETITORS, IDLED USA



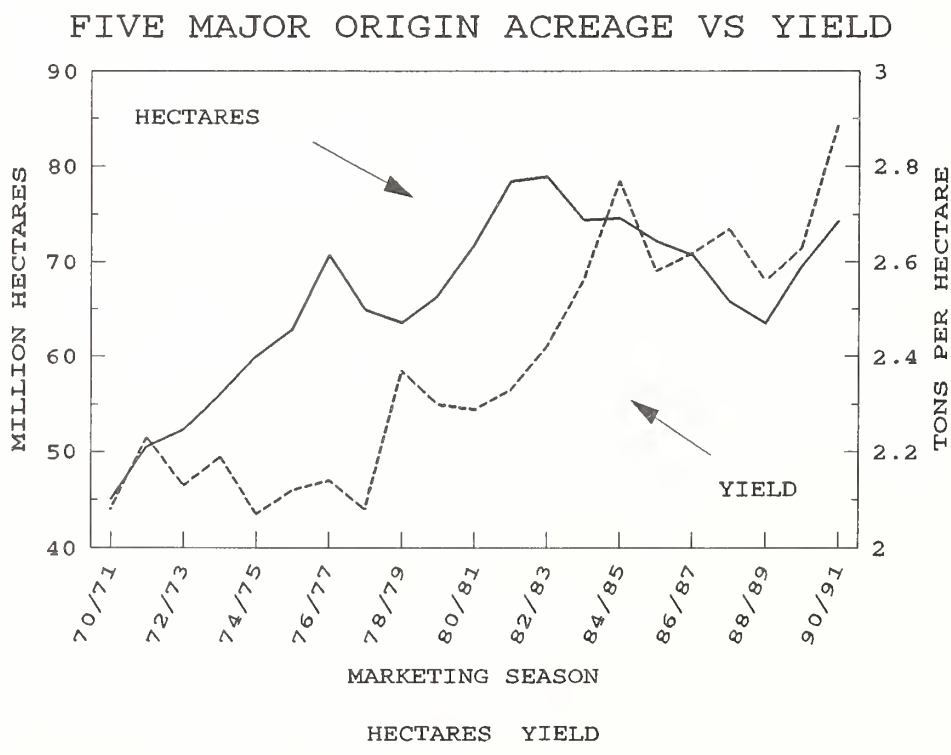
# FIVE MAJOR ORIGIN ACREAGE (left "Y axis") vs YIELD (right "Y axis")

This slide shows that while acreage responds to both world prices and government programs, yields have trended broadly higher interrupted only by poor weather in the 1988 & 1989 seasons and poor/mediocre crops in Australia & North America during the 1980, 1981 seasons.

Although major origin acreage has been restrained in the 1980's, primarily in the United States, major origin yields have now exceeded all previous levels.

The point of these past few slides is that even with acreage restraint in the 1980's, major origin yield increases have still allowed for major origin wheat production increases. Whereas the USA was the major force in lowering acreage during the 1980's, that will not be the case in the first half of the 1990's. The farm bill has placed a limit of 20% on the set aside acreage of US wheat. This compares to a 30% set aside limit in the 1985 - 1990 era. Much of this set aside limit was used in the mid to late 1980's with set asides of 20% in 1984 and 1985, 22.5% in 1986, 27.5% in 1987 and 1988 (the 2 low production years for the 5 major origins of the past 6 years). Even in 1989, after a devastating 1988 North American drought, the US set a 10% set aside rate.

Without the US unilaterally cutting acreage, major acreage will likely not fall below 68 - 70 million hectares. Likewise, production will likely not fall below 185 MMT with normal yields.

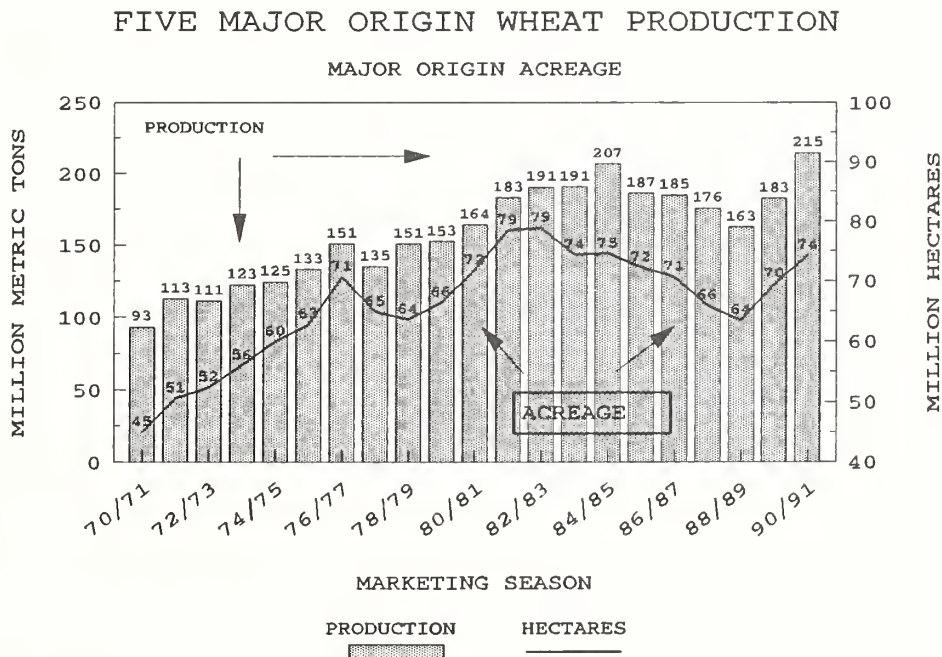


FIVE MAJOR ORIGIN WHEAT PRODUCTION (Left "Y axis")  
Major Origin Wheat Acreage (Right "Y axis")

The relationship between controlled acreage and production by the five major wheat origins is best seen in this slide.

Even with only 74 million hectares of area in 1990/91 (5 million hectares less than 1982/83 peak), the five major origins produced a record 215 MMT, compared to 191 MMT in 1982/83.

In the years ahead, acreage will need to be restrained or import demand will need to be increased significantly to avoid a return to the record exporter (primarily USA) stocks in 1985 and 1986.



## WORLD WHEAT TRADE

### Major Wheat Importers

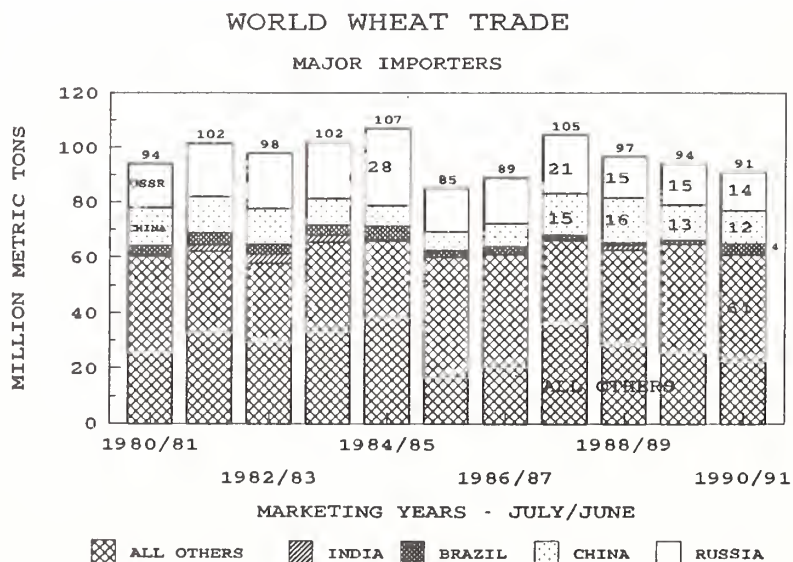
World wheat trade really represents the demand for wheat that is grown by the five major wheat origins. These five origins normally supply 90 - 95 % of the wheat sought by importers. Our forecasts do not differ significantly from those of the USDA. We believe 1990/91 world trade will be about 91 MMT, whereas the USDA forecasts just over 95 MMT. They also forecast wheat exports from "non-major origins at a record/near record 10.5 MMT. We believe low world wheat prices, another poor crop in South Africa, wheat feeding in Eastern Europe due to a poor corn crop will limit wheat exports from the minor wheat origins to 6 - 7 MMT.

This slide shows that world wheat trade peaks in 1984 and 1988 were both due in large part to large Soviet wheat imports (both years exceeding 20 MMT). 1984 represents a very poor wheat crop due to drought, while 1987 represented a poor crop due to an extremely wet harvest. Excluding these years, the world wheat trade has never exceeded 102 MMT.

Alternatively the world wheat trade in the past 10 years has not fallen below 90 MMT with the exception of 1985 and 1986, both years of low Chinese imports (6.6 - 8.5 MMT).

Our forecast of 1990/91 world trade also excludes any significant quantities of wheat trade with Iraq. That forecast will continue until this situation is resolved. Iraq represents about 3 - 3.5 MMT of world trade. The origin most dependent on Iraq for an export outlet is Australia that typically shipped 1 - 1.5 MMT on a July/June basis.

Two other countries that can significantly impact the level of world trade are India and Brazil. All the other countries combined... IE... the world trade to all countries except Russia, China, India and Brazil have generally ranged between 60 MMT and 66 MMT in the past 10 years. This information should assist us in making a projection of world trade for the 1991/92 season.





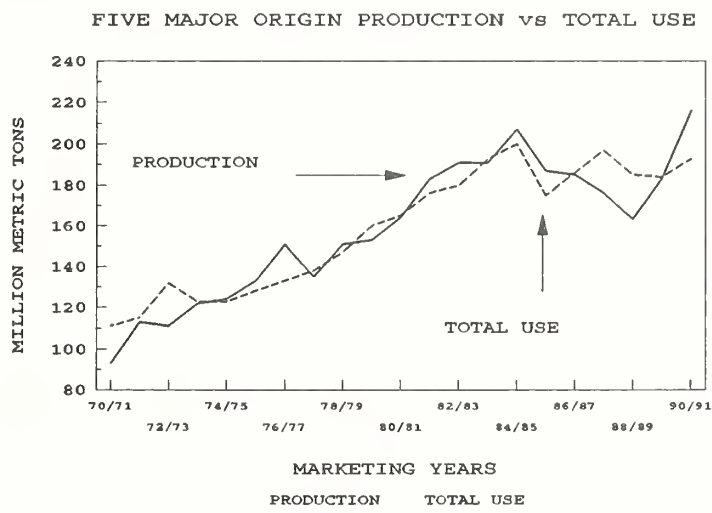
## FIVE MAJOR ORIGIN PRODUCTION vs TOTAL USE

This slide and the next slide have been the most helpful visual descriptive tools in the 1990/91 season - when one compares world wheat values with supply/demand imbalances.

This slide shows the major origin wheat production and use in the 1970 - 1990 period.

Production exceeded Use in the five major origin nations on three separate era's during the past 20 years. These surplus periods are denoted by arrows on the chart...the mid 1970's, the early 1980's, the mid 1980's. Despite ever rising demand in the 1974 - 1984 period, it was not until the mid 1980's that production actually clashed with falling demand (Chinese drop in world imports).

This clash was the probable cause of: record origin wheat stocks in 1986 and 1987; the decline of world wheat FOB values to US (on farm) loan levels; a sharp break in US market share; and the resulting high 27.5% set aside programs for the 1987 and 1988 marketing years.



MAJOR ORIGIN WHEAT SURPLUS (CROP minus USE) - (left "Y axis")  
 Price HRW FOB / USA Loan Rate (right "Y axis")

This slide more clearly shows the magnitude of the major origin wheat surplus in 1990/91.

The data we review in 1970 - 1990 shows the 1990 surplus to be a record 23 MMT (a record 845 million bushels). Put another way 23 MMT looking for a home.

Clearly this figure towers over the surplus' of the mid 1970's and early/mid 1980's. In economic terms it states the 1990/91 wheat trade is aptly described as a buyers market.

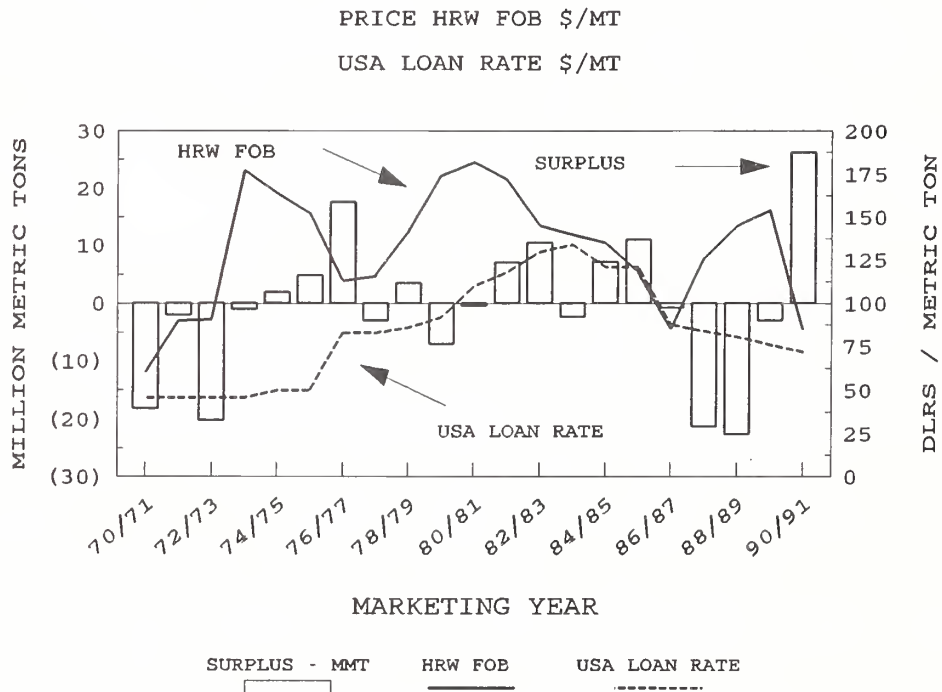
On the right scale one will also see a comparison of the average season HRW FOB price and the USA loan rate in dollars per metric ton.

Price comparisons along with export surplus comparisons leave only 1976 as a possible analog year to 1990. Aside from the weather patters... no major crop problems in wheat, corn or rice, the price similarities are striking: both years began a season with FOB prices at significant premiums to "low loan levels". Both years have estimated wheat stock surplus' of 18 - 23 MMT.

The 1980's did not show a close analog because the wheat surplus was well below what is estimated for 1990 and wheat values were relatively close to "high loan levels".

This graph actually shows average HRW FOB prices of \$85 per ton, whereas today's market is probably in the \$75 - 80 range for competitive HRW wheat. Relative to loan levels, present international prices appear low. This situation is caused by the US/EC subsidy battle.

## MAJOR ORIGIN WHEAT SURPLUS



MAJOR ORIGIN CARRYOUT STOCKS (left "Y axis")  
Average World Prices - HRW FOB (right "Y axis")

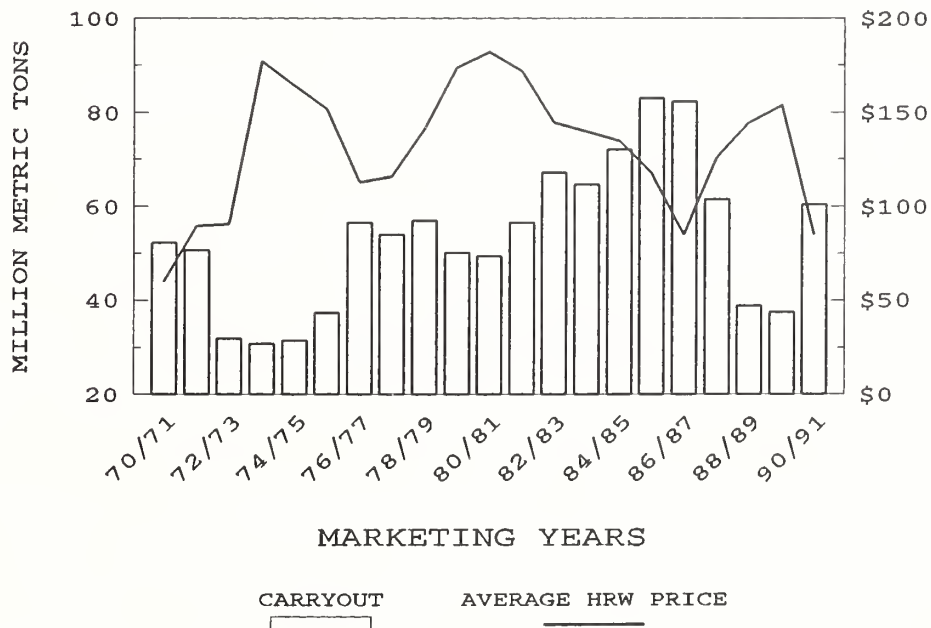
This slide shows the Major Origin carryout stocks along with the average season HRW FOB price in the 1970 - 1990 period.

The points of interest on this chart are:

- (1) \$75 FOB wheat prices are a rare event - seen only in the early 1970's, and late in the 1986/87 season when the USA began liquidating its carryout stocks with large EEP transactions to the USSR and China.
- (2) Carryout stocks appear to be increasing significantly faster in the early 1990's when compared to the early 1970's - both low stock level periods. This is primarily because of the reentry of idled USA wheat acreage in 1990. In the 1970's there was no such pool of idled acreage to draw upon.
- (3) Exporter carryout stocks in 1990/91 are forecast at 60 MMT up 23 MMT from last year's low levels. Reaching 1985/86's record carryout level could be reached next season, had it not been for the USDA's decision to set aside 15% of USA acreage. Admittedly, it would also have taken a second consecutive year of good weather.

## MAJOR ORIGIN CARRYOUT STOCKS

AVERAGE WORLD PRICES HRW FOB

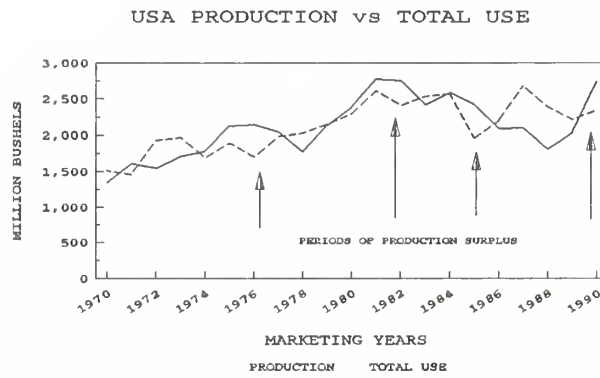


## USA PRODUCTION vs TOTAL USE (Million Bushels)

This slide is similar to the one presented earlier for the five major origins: A comparison of periods of production surplus in the USA.

Like the 5 major origins, the periods of production surplus in the USA are nearly identical. The mid 1970's, the early and mid 1980's all represent periods of surplus wheat looking for a home.

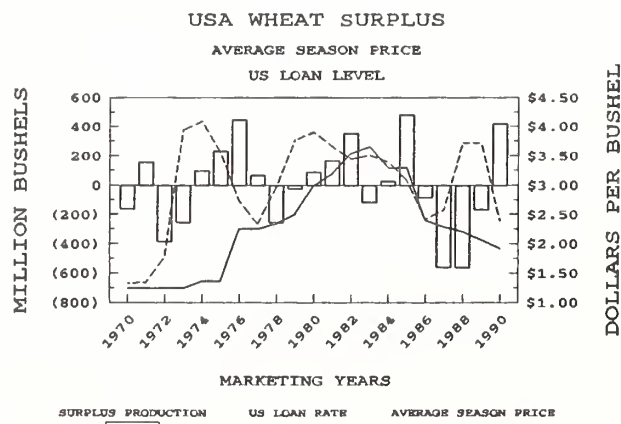
In fact, if it had not been for the 1983 WHOLE BASE PIK PROGRAM and 1983 drought a period of US wheat surplus would have existed from 1980 thru 1985/86.



USA WHEAT SURPLUS - Million Bushels (left "Y axis")  
Average Season wheat price / Loan level (right "Y axis")

This graph compares the USA 1990/91 wheat production surplus to previous production surplus levels in the 1970's and 1980's. Also on the graph along the Y axis right scale you will see the Average season price and US loan rates.

Comparing the 1990/91 season's production surplus to prior years, one finds three other years for comparison: 1976, 1982 and 1985. The price conclusions from these years is that in each of these years the wheat prices approached or reached loan levels by the end of the season.





## USA FREE WHEAT SUPPLIES

### USA Wheat Prices

This slide compares the supply of wheat not under government control to actual wheat prices in May (end of marketing year) and loan prices.

Conceptually, wheat supplies need to be carried by someone. Typically the farmer does not carry wheat from one season to the next unless he is protected by the government loan program. Commercials tend only to carryout wheat which they need to run their operations until new wheat supplies are harvested in June/September.

Commercials will however carry wheat from one season to the next if the marketplace compensates them for doing so. The market compensates commercials carrying large volumes of unwanted wheat by paying the commercials a price that compensates them for interest expenses, insurance costs and storage costs. Without such compensation, commercials would be losing money.

This slide shows the actual free supplies up until the end of the 1989/90 season. For the 1990/91 season the graph shows the wheat that is presently considered free stocks...707 million bushels (Carryout stocks of 957 million bushels less 250 million bushels in the CCC).

One can easily see that this amount of "free wheat" is huge when compared to other years in the late 1970's and throughout the 1980's. One needs however to return to the 1976/77 season to find a comparable quantity. This was the season loan entries began in the USA for surplus wheat.

At the present time there are roughly about 250 million bushels of wheat in the CCC/Farmer Owned Reserve. The wheat in the FOR will mature by the end of the marketing season. Since it has redemption values well above present market prices our expectation is that it will be largely forfeited to the CCC. This will allow the CCC stocks to rise to 250 million bushels, replenish the Food Security Wheat Reserve, and eliminate any pre-1990 wheat in the loan programs.

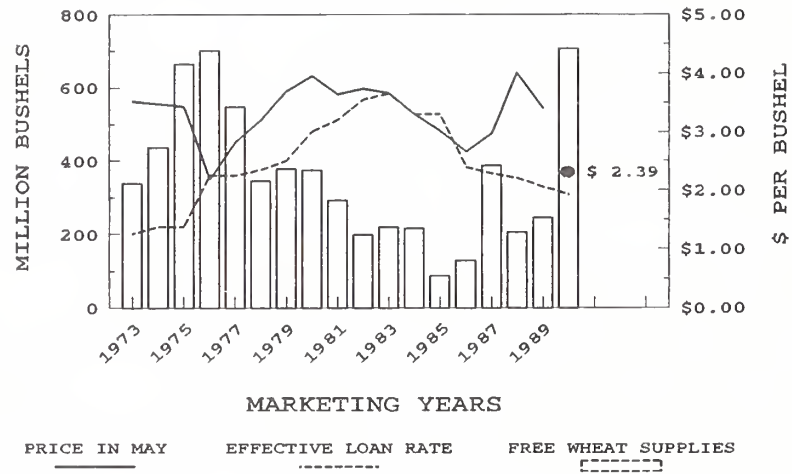
The 1990 outstanding wheat loan's total about 250 million bushels. At present market prices this wheat should be considered free wheat since it can be profitably redeemed with cash and sold to the commercial market place.

If these 250 million bushels of 1990 loans stay in the loan program, and are rolled into the Farmer Owned Reserve when it is opened, it would leave 457 million bushels of wheat as free wheat. A figure still large by historical standards.

The marketplace only needs about 250 million bushels of free wheat to make the transition from old crop to new crop. Consequently the market needs to prevent the existing 1990 loans from coming back onto the market by lowering prices to below breakeven loan redemption levels and/or to move large volumes of free wheat to a carrying charge vs new crop values. This latter option would allow commercials to carry the wheat and be compensated for interest, insurance and storage charges.

## USA FREE WHEAT SUPPLIES

### USA WHEAT PRICES



## USA EFFECTIVE LOAN LEVELS

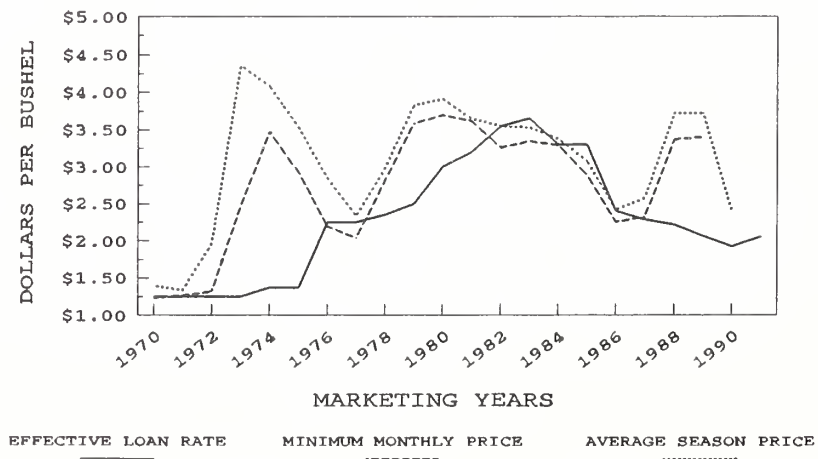
Average Season Prices / Minimum Season Prices

This slide shows the effective US loan rate in the 1970 - 1990 seasons. It also shows the average season price for all wheat in the USA and the minimum monthly price during the season.

The important parts of this graph are that in each of the eras of surplus production we have evidence of minimum season prices reaching slightly below the effective loan rate.... namely in the mid 1970's, the early 1980's and in the mid 1980's.

## USA EFFECTIVE LOAN LEVELS

AVERAGE SEASON PRICE - MINIMUM SEASON PRICE



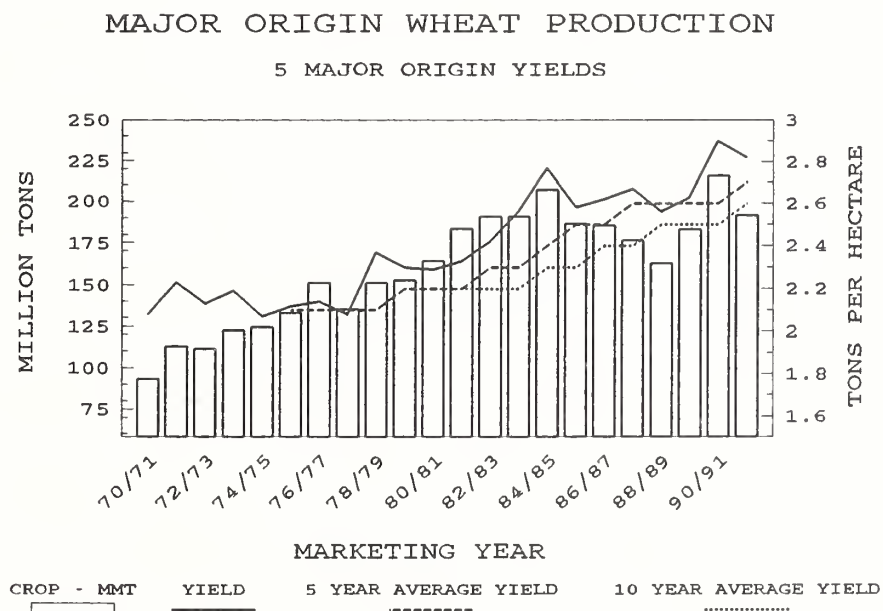
1991/92 MAJOR ORIGIN WHEAT PRODUCTION - (left "Y axis")  
 5 Major Origin Wheat Yields - tons per hectare - (right "Y axis")

This slide shows our forecast of production in the five major origin countries at 191 MMT. Our forecast is highly dependent upon USA spring wheat farmers planting wheat rather than planting the economically attractive minor oilseed crops on triple base acreage, flex acreage and/or 0/77 acreage.

The slide shows that the actual wheat yield we are using is 2.8 metric tons per hectare. We are forecasting acreage of 67.9 million hectares vs 74.4 million hectares this season. The declining acreage is due to our forecast of lower acreage in the USA 3.5 mln hectares, 1 million hectares lower in each of the following origins: Australia, Canada and Argentina.

With normal weather, the normal yield per hectare usually exceeds the 5 year average yield and always exceeds the 10 year average yield. We expect this normal yield to support a 191 MMT crop by the major origins.

Even a repetition of the poor weather in 1988 weather would result in a yield above the 10 year average of 2.6 tons/hectare.



## FIVE MAJOR ORIGIN PRODUCTION vs TOTAL USE

The next slide again is similar to what was shown earlier. Now we have included the forecast for 1991/92 to wheat we presented earlier.

Again, as we assume normal weather and yields for producers, we do the same for importers and import needs. Assuming normal weather in importing nations, it is likely that total major origin use of domestic use plus exports will increase to 195 MMT resulting in a 4 MMT drawdown in stocks or a 4 MMT deficit production level by the 5 major origins.

The world wheat trade forecast in 1991/92 is 97 MMT, 91 MMT by the major origins and 6 MMT by the minor origins. Soviet imports are forecast at 16 MMT, China at 14 MMT, Brazil at 4 MMT, India at zero, and all other countries at 63 MMT.

In global terms this 4 MMT change in stocks by the major origins is negligible. Since there is only a small drawdown in stocks, prices need not fall to government support levels (loan levels) in 1991. On the other hand prices only need to maintain levels which encourage exporters willingness to satisfy this import demand rather than hold onto stocks.

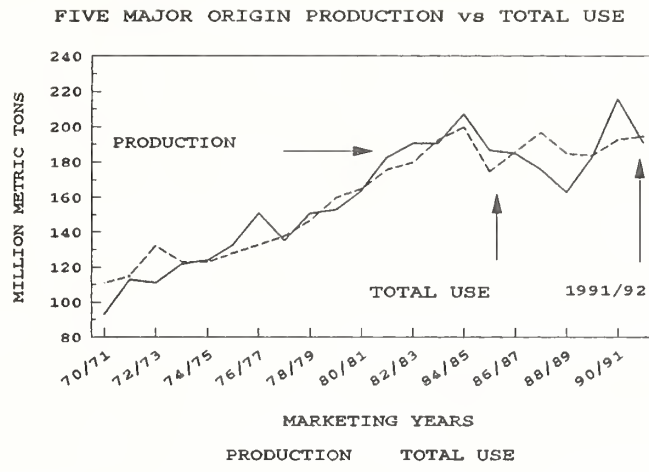
In the USA a trading range of prices somewhat above loan levels appears most likely at this point in time. In the world market, values will be much more dependent on the GATT talks and the willingness of exporters to market their wheat with very large subsidies.

In a rational world, it is unlikely that world values need to fall further than the present \$70 - 75 FOB / ton level for world wheat. Present world values should be considered attractive for world importers.

All of the above 1991/92 wheat comments will be subject to significant change depending on weather conditions in 1991/92 and the outcome of the GATT talks. Finally, the outcome of the USA corn crop is also of significant importance since world coarse grain stocks remain very low. A significant deterioration in USA corn yield could significantly increase the demand for domestic USA wheat and International wheat. Domestic wheat prices and international wheat values are near or well below corn values.

The reason why the US corn crop is so important to wheat values in 1991 is that the coarse grain stocks are low and the USA corn crop is larger than the combined total wheat crops of the five major wheat origins.





## 1991 WHEAT PROGRAM

The final chart to show you today, illustrates the important domestic USA price levels to be monitoring in the coming year.

### 1991 WHEAT PROGRAM

Dollars per bushel:	
GIVEN:	Calculated:
Target Price: \$ 4.00	
	\$ 3.80...RESERVE STORAGE STOPS 95% of Target
	\$ 3.08...CCC Sales Price (150% of Loan Rate If There Is a F.O.R. In 1990 Crop.)
	\$ 2.17...Break Even Loan Redemption - \$ 2.17 assume interest 8% year
Regular Loan Rate: \$ 2.05	Maximum Deficiency Payment = \$ 1.95
	\$ 1.83 Net Loan Rate - \$ 1.83

## Conclusions:

In making your plans for the coming year and even in the next few year's one would be well advised to think about how these factors just presented will fit into our world of wheat trade, world surplus', acreage, yields and prices.

What happens if there is no resolution to the GATT and export subsidies continue at today's pace ? And major origin yields continue their trend line increase? And the USA limits it's acreage set asides to 20% as required by law? And the USA limits entry of wheat into the FOR to 450 million bushels as required by law? What if the Soviet's are able to achieve their desired goal of halving or eliminating wheat imports?

All of these issues will likely accelerate the pace of agricultural change.

Thank you.

# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91, Session C4

For Release: Wednesday, November 28, 1990

## **A COMPETITOR'S VIEW OF US FARM PROGRAMS**

Dr Brian Fisher  
Executive Director  
Australian Bureau of Agricultural and Resource Economics

### **Introduction**

One of the fundamental and most difficult aspects of relationships among countries is the extent to which they acknowledge that their internal policies affect others. Most countries guard their rights to determine domestic policies jealously and their representatives often regard outside criticism as meddling. Yet in the increasingly integrated world economy that has emerged in the past two decades, it has become very evident that the national or domestic policies pursued by individual countries do greatly affect the efficiency with which world markets operate and the welfare of people in other countries.

It is extremely difficult to delineate clearly between policies that are domestic and those that are external. Policies designed to support farmers' incomes might be categorised as domestic. However, in most cases they influence production, consumption and prices and through those variables they affect quantities traded and the levels and degree of stability of world market prices. They become external as well as domestic policies. In fact many policy instruments such as tariffs and export subsidies are applied primarily to attain domestic price and income objectives despite being clearly trade distorting.

It is becoming increasingly difficult to find examples of international markets for agricultural products that are not markedly distorted by national policies. World markets for sugar and dairy products in particular are distorted (see Roningen and Dixit 1989). Furthermore distortions in particular markets spill over into others. A good example that has been analysed recently is US sugar policies which, over the period 1982-88, are estimated to have depressed world sugar prices by 21-33 per cent and imposed a cost on US consumers of between \$2300m and \$2900m a year. In addition the reduction in US grain prices resulting from the 1985 Food Security Act further stimulated US sugar production, reducing world sugar prices by another 9 per cent by 1988 (Sturgiss, Field and Young 1990).

The prevalence of trade distorting policies in agriculture reflects the relative lack of success in reaching agreement within the General Agreement on Tariffs and Trade on rules to prevent or limit the use of many trade distorting measures. The Common Agricultural Policy of the European Community is probably the most comprehensive example of domestic support policies that are trade distorting. However, many other countries including the United States also have widespread agricultural support regimes (see Riethmuller et al. 1990, pp. 6-7).

While producers in competing exporting countries lose from others' protective policies, the main direct losers from agricultural protection are the economies that provide the protection in the first place. It has been estimated (World Bank 1986) that potential gains to industrialised economies from the elimination of agricultural protection in 1985 would have been US\$48.5 billion in 1980 values, which is equivalent to US\$76 billion in 1990 values.

Many of the problems encountered in world agricultural markets by the mid-1980s are acknowledged to have resulted from national policy interventions. At the Tokyo summit in 1986, the heads of the seven major industrialised countries noted with concern that global structural surpluses for some important agricultural products existed and that they arose from long-standing protection policies as well as from technological improvements and changes in the world market situation (see Miller 1986, p. 112). These structural surpluses are now re-emerging following the temporary respite provided by the 1988-89 North American drought.

Australians have found it gratifying that the US Administration has recognised the importance of negotiating substantial multilateral reductions in trade distorting agricultural support measures and has been pursuing such reductions forcefully within the Uruguay Round. Determined leadership by the United States is essential if substantial progress is to be made in liberalising agricultural markets. If the tide of agricultural protectionism is not turned around as a result of the Uruguay Round negotiations, it will be at a great economic cost globally.

### The current situation in Australian agriculture

The current situation in Australian agriculture is similar to that facing American farmers at the height of the US rural recession from 1983 to 1985. This year, the real net cash incomes of Australian farmers have declined sharply. The reduction is greatest in the mixed livestock and crops industry, at 65 per cent, followed by 56 per cent for the sheep industry and 49 per cent for wheat and other crops (ABARE Research Resource Group 1990 – see also table 1). This is in a year when seasonal conditions across most of the country have been good to excellent. In fact, the real net cash income of Australian farmers this year is estimated to be slightly lower than in 1982-83, the worst Australian drought in living memory.

Table 1: Australian farm cash operating surplus

	1989-90	1990-91 p
	\$	\$
<b>Zone</b>		
High rainfall	34 540	19 628
Pastoral	88 109	48 836
Wheat-sheep	59 434	26 784
<b>Industry</b>		
Beef	27 978	25 791
Livestock-cropping	61 049	21 570
Sheep	58 032	25 718
Sheep-beef	47 891	30 039
Wheat-other cereals	58 903	30 173
All broadacre	51 937	25 452

p Provisional estimate



The present difficulties in Australian agriculture are primarily market related. They arise because Australian agriculture is exposed to world market forces and because export demand is down and supplies are plentiful. This is especially so for wool and grain which along with beef comprise the backbone of our broadacre agriculture.

One of the traditional means by which Australian farmers have weathered depressed market conditions for individual commodities has been to switch production to items for which prices are more profitable. This flexibility has been of particular importance to Australia's grain and sheep farmers. For example, when market conditions were unfavourable for grain from 1985 to 1987, many farmers in the large area called the wheat-sheep zone changed the balance of their operations toward sheep. Now the wool market is depressed and that avenue of adjustment no longer exists. Just as grain growers no longer have wool to turn to as a profitable alternative, wool producers face low returns if they try to adjust into grain growing.

The reduced demand for Australian wool can be attributed partly to the political and associated economic upheavals in the Soviet Union, Eastern Europe and China. This reduction has followed an expansion in the sheep flock that occurred in the period 1985-88 when wool prices were high and grain prices were low.

Australian farmers observed that from 1985 to 1988, the United States pursued aggressive export subsidy policies for grain with a stated objective of winning back market shares that Americans saw as having been lost in the first half of the 1980s because of the unfair protectionist policies of others – in particular the European Community. Competitive subsidisation between the United States, the European Community and Canada depressed market prices. This situation was interrupted temporarily due to the 1988-89 North American drought, but has now re-emerged. With the recent heavy world grain supplies, restrained import demand and a renewal of higher levels of export subsidisation by the European Community and the United States, prices received by Australian farmers have fallen sharply. At the farm gate level this year, Australian wheat growers will be receiving about half the US target price of US\$4.00 per bushel.

In 1990-91 (October-September marketing year), the average net return to Australian growers for wheat delivered to silos (Australian standard white wheat) is an estimated \$A98/t compared with last year's figure of \$A146/t. In terms of US currency the prices are equivalent to US\$2.08 per bushel in 1990-91 compared with US\$3.06 per bushel in 1989-90.

Australian grain farmers now look on the world market as being heavily corrupted by the competitive subsidisation policies of other countries including the United States.

### **Australian farmers' impressions**

Most grain farmers in Australia are reasonably well informed about US grain programs, at least in general terms. In frequent discussions with farmers and representatives of farmer organisations, the following comments about US programs are often made:

- they cost US taxpayers billions of dollars;
- they are structured in such a way that US producers respond not to market forces but to program incentives;
- they provide US farmers with prices, after benefits have been paid, that are normally well above those applying on the world market;



- when world prices are low, the United States has applied export subsidies which have made them lower still:
  - such subsidies have been a response to other countries' subsidies – they have reduced the profitability of producing in Australia and have reduced the size of the Australian industry;
- there is a confusing disparity between the strong advocacy for reductions in support internationally by the US Administration, the determined application of the export enhancement program by that same Administration and the generally protectionist legislation enacted by the US Congress;
- there are some elements of US programs whereby US farmers are paid not to plant certain areas at certain times, and the usual response of farmers has been not to plant on their poorest land; they could even be paid not to plant areas that they would not have planted at market prices anyway; and
- the programs have resulted in US farmers becoming dependent on government transfers.

There is some acknowledgment that US policy makers have tried to adjust US production to limit the extent of the surges in stocks that have characterised the US grain industries. However, bad errors of judgment have been made in the past in policy settings, and these have at times even acted to exacerbate market imbalances.

### **Observations about these impressions**

Having said what I've observed to be the general reaction of Australian farmers to US programs I would like to revert to my role as an economist and policy analyst to examine these popularly held impressions.

Many of these impressions are clearly true. The programs are expensive at least relative to the market value of the products they support.

Over the five year period covered by the 1985 farm bill, CCC net outlays on the feed grains and wheat programs totalled US\$49 billion or 63 per cent of total net outlays on all commodity programs (US Department of Agriculture 1990). Cash receipts from grain industries over that same five year period will have totalled some US\$112 billion or only 15 per cent of total receipts from farm marketings. Clearly the US programs have been expensive in total and those for grains have been expensive in particular. Also a large part of grain growers' returns has been provided by the government either as direct payments or as losses on government 'trading'.

If one looks behind the aggregate figures, however, there is some promise of a reduction in US grain support costs provided the US government does not move much more heavily into export subsidisation.

A large part of the government outlays in the second half of the 1980s was on price support loans. Those outlays were especially large in 1986 and 1987 and reflected large accumulated government stocks, which in turn were associated mainly with previous loan rates being set at uncompetitive levels. With the subsequent decline in government stocks due largely to the 1988-89 drought, an important program cost element will have been removed, provided loan rates are not increased markedly and the US government does not expand its export subsidy programs.

Even so, since 1984, deficiency payments have averaged about \$1.10 per bushel for wheat and about 55 cents per bushel for corn and sorghum. Given average wheat and feed grain production, and program participation rates around those in recent years, such levels of deficiency payments would expose US taxpayers to a cost of roughly US\$6 billion a year – a considerable amount in the context of budgetary disciplines. Of course it is difficult to forecast whether unit deficiency payments will be as large in the future as in the past, given the volatility in world prices that has been evident in recent years.

The framers of the 1990 legislation appear to be banking on deficiency payment support being considerably less than this, with the cost cuts coming from restrictions on areas of program crops that will be eligible for deficiency payments rather than reduction in target prices in nominal terms, as applied in the 1985 bill. The triple base option that is incorporated in the 1990 bill (see de la Garza and Madigan 1990) is likely to result in greater planting flexibility, and some people may argue that if the areas on which deficiency payments are to be made are sufficiently low, the programs will have little influence on quantities produced and market prices. I believe that the jury is still out on that question as the risk reduction effects from providing support on limited quantities could distort investment decisions and therefore affect production in excess of the quantities of the program crop supported and of alternative crops. Nevertheless, the moves toward limiting areas and yields on which support are provided seem to be an improvement on past arrangements in terms of the extent to which program arrangements distort markets.

One of the important US policy changes in recent years has been the marked reductions of loan rates. Such reductions have resulted in market prices more closely reflecting current world supply and demand balances. They have also resulted in the US government greatly reducing its former large public stock holding role. So one avenue whereby the US government could directly determine world prices at a particular time has, at least for now, been largely removed. That does not necessarily mean, however, that US programs now have a lesser influence on world trade and prices. Other mechanisms such as deficiency payments, acreage reduction arrangements and export subsidies through the export enhancement program all markedly affect world prices.

As the deficiency payment arrangements applied in the United States reduce risks faced by growers and increase prices, they are inherently production stimulating and if left unchecked would expose US taxpayers to substantial costs and depress market prices. The US government has tried to manage those consequences through acreage reduction programs and recently through the conservation reserve program and elements in the programs that limit the responsiveness of production to support or target prices. This has been an expensive way to keep US production at levels that, over time, have probably not differed greatly from those that would otherwise have applied (Roberts, Love, Field and Klijn 1989).

From an economist's perspective the most retrograde policy step that has been taken with the US program in the past decade has been the introduction of export subsidies, such as the export enhancement program, and marketing loans. Export subsidies result in losses to the US economy and depress prices received by producers in other exporting countries – at least those in countries like Australia who produce largely unassisted.

An argument that has been popular in the United States is that the export enhancement program was necessary to win back markets that were unfairly taken by subsidising competitors, in particular the European Community. If anyone is in a position to appreciate the effects of unfair subsidised competition it is Australian farmers. In the 1960s Australian agriculture was geared to supplying large quantities of butter, cheese, sugar, meat and canned, dried and fresh fruit and some grain to the United Kingdom. With UK entry into the European Community that trade in



most of those items just disappeared, or was reduced to a shadow of its former levels. Instead of having preferred access, Australian farmers faced subsidised competition on the new markets to which they were forced to turn. Then, since the mid-1980s they have seen the United States entering into competitive subsidisation with the Europeans to win back markets that the US farmers had lost in the first half of the 1980s, largely as a result of the high US loan rates in that period and appreciation of the US dollar. Of course, it is possible to win back market share by moving bonus grain onto the market in such a way as to encourage exports. It is obvious that the EEP is successful in increasing exports. But the Europeans also have deep pockets and they could and have easily matched US export subsidies. Australian farmers lost much from the competitive subsidisation between others. It is estimated that in 1986-87 and 1987-88 combined, the cost to Australian wheat growers as a result of the price discriminatory effect of EEP sales was between US\$150 million and US\$238 million (Roberts and Love 1989). Following a brief respite in 1988 and 1989, Australian farmers feel that they are once more having to cope unassisted in competition with subsidised grain from the Northern Hemisphere.

Another American argument that has been advanced in favour of the export enhancement program is that it is an important strategic trade policy instrument. It is claimed to have been successful in bringing the European Community to the table in the Uruguay Round. Although it is questionable whether the EEP, rather than other incentives such as the desire of the Community to obtain gains from trade in other areas such as services and intellectual property rights (see Harris 1989), brought the Community to the table, the EEP may have contributed marginally. But getting the Community to the negotiating table on agriculture is not an outcome in itself. Benefits from such actions will only be realised from a successful outcome to those negotiations. Success in this context will be attained only if substantial liberalisation is achieved through reductions in all elements of government support – border protection, internal support and export subsidies. With strong US leadership and support from other countries seeking liberalisation, it is to be hoped that greater liberalisation can be agreed upon. While the recommendation of the US General Accounting Office (1990) to re-evaluate the EEP after the Uruguay Round is concluded is reasonable in this context, there is concern in Australia that, should the hoped for gains from the Round not materialise, Australian producers and those in other countries which do not significantly subsidise their agriculture could continue to be adversely affected by competitive subsidisation between the United States and the European Community.

### **Concluding comments**

The situation that has existed in world markets for grain since the mid-1980s has been basically one of surpluses and competitive subsidisation by the largest exporting countries. The 1988-89 'shortage' was no more than a temporary weather shock and the situation has now returned to one of competitive subsidisation. There is, however, one significant difference – the lowering of the US loan rates has meant that the imbalance is being reflected directly in current low world market prices rather than in large public stock accumulations.

Grain exporting countries can be divided broadly into 'supporters', 'manipulative adjusters' and 'adjusters'. The European Community clearly falls into the supporters groups. The United States is a manipulative adjuster but also a supporter, and Australia and Argentina are fundamentally price taking adjusters. Canada has largely become a supporter in response to the competitive subsidisation of the European Community and the United States in recent years, although the certainty of support is probably still less than in the European Community or the United States.

There is one thing in common between the United States, the European Community and Canada apart from the large amounts of money and resources that they have expended on competitive

subsidisation – they all subscribe to a rhetoric of the merits of maintaining market shares. Success of policies is often gauged, not by the economic benefits to the nation from policies that increase or sustain exports, but by the political criterion of market share. It is apparent in the recent years of competitive subsidisation that the countries which have been doing the subsidising have only achieved their market shares at a substantial cost to their taxpayers and consumers. If those costs are heeded and a more liberal trading environment in which producers can compete much more in terms of their efficiency results, some good might yet come of the state of affairs into which world grain markets have sunk.

Looking at the provisions of the 1990 farm bill, it is evident that the basic course set in the 1985 bill will be continued. There have, however, been some significant improvements at the margin which could make US policies less market distorting as well as less costly to taxpayers than the extremely costly measures in the 1985 legislation. Nevertheless the provisions for export subsidies remain. While they are in place they will be a cause of trade friction as well as an impediment to the efficient operation of the market.

It is evident that the US Administration has recognised the need to bring some sanity into national agricultural policies which affect international trade. It has advanced a comprehensive strategy to the Uruguay Round that if forced through will, in time, bring about great benefits internationally. If, on the other hand, many of the potential reforms cannot be achieved, all agricultural exporting countries will be condemned to a continuation of the unsatisfactory policy and economic conditions in agriculture that became very apparent in the 1980s.

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# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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Outlook '91, Session #C5

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## OUTLOOK FOR DAIRY

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Dairy markets in 1990 were characterized by wild price swings. Counterseasonal price rises occurred when seasonal declines usually occur. Counterseasonal price declines occurred when seasonal increases usually occur. Milk and dairy product prices during the normal seasonal price peak of November-December will be among the lowest of 1990. A fitting end to the crazy markets of 1990.

As an unusual price year comes to an end, we look to 1991 and a return to more normal seasonal price patterns. In addition, dairy markets in 1991 will be characterized by sharply lower prices, a continued expansion in milk production, and increased commercial sales of dairy products.

Forecasts for 1991 take into account dairy provisions included in the 1990 farm bill and the 1991 deficit reduction bill. These provisions include: a minimum price support price for manufacturing grade milk of \$10.10 per cwt; price support adjustments based on projections of Commodity Credit Corporation (CCC) purchases of dairy products under the price support program on a milk equivalent, total solids basis; and a 5 cent producer assessment associated with deficit reduction.

### Commercial Use

Strong domestic cheese demand and recovery in butter use were the primary forces contributing to a more than 5 percent increase in the commercial use of dairy products during the first half of 1990. Fluid milk sales ran fairly even with a year earlier. Frozen yogurt sales increased sharply, while sales of other frozen dairy products and cottage cheese fell.

Second half commercial use has been affected by the sudden loosening of tight markets, as product supplies increased and the demand for pipeline holdings

fluctuated. Nevertheless, a general pattern of continued recovery in butter sales, substantial (but possibly lower) growth in cheese use, and declining commercial use of nonfat dry milk is expected for the second half of 1990.

Recent price declines are expected to offset the effects of a weakening economy and higher inflation rates. For all of 1990, commercial use of dairy products is forecast at 140 billion pounds (milk equivalent, milkfat basis), more than 3 percent above a year ago.

In 1991, commercial use is forecast to be up 1-3 percent from 1990, as the continued recovery of cream-based product sales and further growth in cheese use are expected. Forecasts for the general economy support a continued strong use of dairy products in 1991. However, risks of a recession-induced weakening are higher than in recent years. Disappearance of skim solids in 1991 are not expected to match 1990's because of weaker disappearance of nonfat dry milk.

### Milk Production

Milk production started 1990 about 1 percent above a year earlier. During the spring and summer, milk production rose more than 2 and 4 percent, respectively, from the weak output of a year earlier. However, growth in milk output remained steady and moderate when compared with 1988 levels. High milk prices since mid-1989 created ample incentives for increases.

Although milk-feed price ratios have been favorable, milk output per cow has not been able to surpass trend. Increases in concentrate feeding generally have been moderate. Nevertheless, output per cow clearly has recovered from last year's weak levels.

Sharply improved returns since mid-1989 have reversed earlier declines in milk cow numbers. Although rises have been relatively small, milk cow numbers were slightly above a year earlier during the second quarter of 1990 for the first time in 5 years. Dairy farmers apparently remained conservative about expansion and new investment.

Although fourth quarter milk prices are forecast substantially below a year earlier, returns over concentrate costs are expected to be relatively favorable. As a result, milk production is projected to follow recent patterns. Milk cow numbers probably will average a bit above a year earlier. Year-to-year change in milk per cow is expected to be smaller than during the third quarter, but only because of 1989's recovery between the third and fourth quarters.

Total 1990 production is projected at almost 148 billion pounds, up more than 2 percent from 1989. Milk cow numbers are expected to be close to last year and milk per cow will rise more than 2 percent from the weak 1989 level, but only 3 percent from 1988.

## Production Outlook

Many dairy farmers likely will enter 1991 in a good financial condition and could consider expanding their operations. Average debt-asset ratios have declined considerably over the past few years and some of this year's high returns could be available as liquid assets. However, in recent years farmers generally have been conservative about expanding and taking on new debt.

Early-1991 output is projected to post a sizable rise, as the high milk prices of late 1989 and 1990 generate enough pressure for milk production to expand in the near future. However, production increases will be eroded as the year progresses, as the combination of falling milk prices and fairly steady concentrate feed prices reduce favorable milk-feed price relationships.

If in 1991 milk prices fall as much as anticipated, the milk-feed price ratio could drop from the 1.7 posted last year to about 1.3-1.5. These ratios are associated with below-trend growth in concentrate feeding and milk per cow. In addition, returns over concentrate costs could fall about 25 percent from 1990's near record to the lowest level since 1978.

Annual 1991 production is projected to rise 1-2 percent, as a modest gain in milk per cow outweighs a slight decline in cow numbers. Relatively low milk-feed price ratios probably will hold milk per cow to below-trend growth.

## Stocks

While the milk equivalent (milkfat basis) total of commercial stocks throughout 1990 was similar to levels in 1989, the composition of these stocks was markedly different. In 1989 butter holdings were ample, American cheese stocks stayed low, and manufacturers' stocks of nonfat dry milk were small relative to commercial use. In 1990, cheese stocks increased as storers tried to replenish low levels and butter holdings declined considerably. Also, manufacturers' stocks of nonfat dry milk started to back up when relatively high wholesale prices in early summer and signs of market weakening led nonfat dry milk buyers to cut purchases to a minimum and wait for prices to drop before buying more aggressively.

The only significant Government stocks continue to be of butter. As of November 1, the CCC held no uncommitted inventories of American cheese and only about 35 million pounds of nonfat dry milk.

## Government Purchases

After 2 years of buying nothing but butter under the milk price support program, the CCC has been buying nonfat dry milk since September, when market prices dropped to support in the West. Nonfat dry milk purchases are expected to continue during the rest of the year. Commercial use is not expected to be strong enough to absorb available supplies. Similarly, large butter purchases will continue.

For all of 1990, net removals of dairy products are forecast to be close to 8 billion pounds (milk equivalent, milkfat basis) down from 9 billion pounds a year earlier. Net removals in 1991 are expected to be near the total removed this year. Commercial use in 1991 is forecast to grow only slightly more than milk production. Purchases of butter in 1991 are expected to be lower, while more cheese and nonfat dry milk will be bought.

### Wholesale and Farm Prices

Price patterns during 1990 have been anything but normal; neither the seasonal price declines of the spring nor the seasonal autumn increases have occurred. Strong commercial cheese sales and memories of 1989's tight markets for cheese and nonfat dry milk shaped wholesale prices during the first half of 1990.

Manufacturers' and buyers' overreaction to the availability problems of late-1989 sent wholesale prices soaring. However, by late summer, wholesale prices started to tumble. Milk supplies were increasing, demand for user stock building was satisfied, and manufacturers' stocks were beginning to grow. By late October, prices were at or near support purchase levels.

Counterseasonal rises in cheese and nonfat dry milk prices boosted milk prices during the first half of the year. However, the counterseasonal declines in wholesale cheese and nonfat dry milk prices brought the October Minnesota-Wisconsin (M-W) price of manufacturing grade milk down to \$10.48 per cwt, \$2.95 below the July peak and \$3.39 under a year ago.

The M-W will decline further by yearend. By November-December (the normal seasonal peak), the M-W will be at its 1990 lows.

Despite late-1990 weakness, the annual average milk price will be a record of about \$14.00 per cwt, up about 3 percent from 1989 and about 14 percent from 1988. Even adjusted for inflation, 1990 milk prices were relatively high.

In 1991, milk prices are expected to fall \$2-3 per cwt below 1990 levels. Markets are likely to be operating under a situation of larger milk supplies, rebuilt stocks, more normal seasonal changes, and possibly a slackening in commercial use of skim milk.

### Retail Dairy Prices

Retail dairy prices were slow to follow early-1990 declines in wholesale and farm prices. As early as February, signs emerged that wholesale product prices might be starting counterseasonal price rises. During April-June, retail dairy prices rose a tenth from a year earlier, as widening of the farm-to-retail spread more than matched the jump in farm prices. Retail prices continued to rise sharply from a year earlier during the summer. However, dramatic, late-1990 declines in wholesale and farm prices are expected to start eroding retail dairy prices.



For all of 1990, retail dairy prices will average about 9 percent above 1989. In contrast to the eighties, dairy prices in 1990 rose substantially more than did price indices for all food or all consumer items.

The downtrend in retail dairy prices probably will continue through most of 1991. For the year, retail dairy prices are expected to decline 1-4 percent, depending on how brisk retail movement remains.

#### **International Trends**

World prices of major dairy products have fallen considerably since the beginning of 1990, as export supplies and stocks increased in the major producing nations. Sales of heavily discounted product by some East European nations have added downward pressure on world market prices. Also, world consumption of dairy products has remained stable. The downward trend in world dairy product prices is expected to continue well into 1991. This trend does not provide a bright outlook for U.S. commercial exports.

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## REACTION TO DAIRY SITUATION AND OUTLOOK

James S. Fraher  
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As a respondent, Sara Short has put me in a difficult position: I haven't much to add to her current dairy analysis and 1991 outlook. Actually, I think USDA does an excellent job of predicting what's next in store for the industry.

I would comment that, in view of the extreme weakness in late 1990 prices, a \$2-3 per hundredweight drop in average 1991 producer prices appears to me to be a little on the high side. At this point, I would peg the drop from year earlier prices in the \$1.75-2.25 per hundredweight range.

In the late 1970s, when I was first becoming acquainted with the dairy business, I was taught that dairy, unlike many other agricultural commodities, was a stable enterprise. Producers and processors had structured their operations based on a predictable cash flow.

For much of the 1980s, dairy markets and prices were generally stable. This was not surprising since CCC purchases of surplus dairy products averaged over 9 billion pounds per year from 1980-1989, or almost 7 percent of average U.S. milk production. During the 1970s, by comparison, CCC removals averaged 3.6 billion pounds per year, or 3 percent of total supplies.

In fact, the tighter dairy markets of the past three years have underscored the basic economic fact that small changes in dairy supplies and sales can produce large swings in prices. A recent example will illustrate the truth of this proposition.

From 1988 to 1989, U.S. milk supplies decreased 1.2 billion pounds (-0.8%), while total commercial disappearance decreased 1 billion pounds (-0.8 percent). Yet, average producer prices increased by \$1.30 per hundredweight, or by 10.6 percent.

Granted, the "wild card" of large 1989 U.S. non-fat powder exports, provided impetus for the price boost. Current dairy market conditions are providing a similar illustration of the

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large impact "expectations" can have on short run prices.

Nevertheless, it is the juxtaposition of a slow, small producer response to price changes with inelastic consumer demand which underlies much of the volatility in dairy prices. By any measure, the price swings experienced by the industry since 1988 have been large compared with changes in underlying dairy supply and demand conditions.

There is, however, an additional factor which has contributed to this price instability: a reduction in Federal government involvement in the industry. Measured by the 10 year trend in CCC purchases, these changes do not look dramatic. Current purchases, on a butterfat equivalent basis, are about equal to average purchases for the last 10 years.

Changes in support prices show the trend in a different light. Since October 1981, when U.S. support purchase prices reached their historic highs, the purchase price for butter has been reduced by 58 cents per pound. The corresponding decrease for 40 pound blocks of cheddar cheese and for non-fat dry milk have been 32 cents per pound and 12 cents per pound, respectively.

These support price decreases translate to a \$3.00 per hundredweight, or a 23 percent reduction in the support price since 1981. By comparison, from 1971 to 1980, the support price increased by over \$8.00 per hundredweight.

More importantly, declining government support is reflected in declines in net taxpayer outlays for dairy programs. For the 1982-83 fiscal year, dairy program costs reached a record \$2.5 billion. For the 1990 fiscal year, expenditures were just under 500 million dollars, a savings of 2 billion dollars, or 80 percent, compared with 1983.

Of greater long-term significance, the 1990 Farm Bill "capped" dairy program expenditures at the cost of purchasing 7 billion pounds of total solids milk equivalent. Purchases in excess of that level, absent a supply management program, will be funded by an assessment on all dairy farmers.

In the event the 1992-1995 supply/demand balance weakens substantially, dairy farmers will face the alternative of agreeing on a supply management program (and securing political backing for the approach chosen), or facing milk check deductions beyond those already programmed by the 1990 Deficit Reduction bill.



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The U.S. dairy industry will likely have to learn to live with both increased price volatility and reduced government support. I think we can also agree that, as a general proposition, seasonal and year to year price variability will tend to increase as a result of declining government intervention in dairy markets.

In such an environment, dairy farmers, processors and marketers will need to further adjust the way they do business. The financial risk associated with all aspects of the dairy business has increased.

Sara Short commented that "dairy farmers apparently remain conservative about expansion and new investment" in spite of recently favorable prices.

In the Northeast, much of the additional income of the past two years was used to make needed improvements in existing facilities, replace machinery and pay down loans. Farmers, with some exceptions, did not add debt to finance expansions.

At the same time a large number of producers continue to exit the dairy business.

While recent prices have been favorable, producers were wary, and rightly so, regarding the length and breadth of the market's strength.

The price crash of 1991 will be the largest year to year reduction in prices ever. In reacting to the price drop, dairy farmers will be concerned not only with the level of price, but with price instability. The combination of these factors will result in a faster braking of the upward momentum in milk supplies than would occur in a more stable price environment.

In the space of one year, producer pay prices will have gone from record levels to the lowest prices in over a decade. By as early as mid-1992, the roller coaster would be on its way back up.

This possibility is made more likely by the fact that USDA is currently estimating that the average 1991 all milk price will be in the \$11.00-12.00 per hundredweight range. For 1989 USDA estimated that the U.S. total economic cost of producing milk was \$13.62 per hundredweight. Clearly, 1991 milk prices will be far below the average cost of producing milk.



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Dairy processors and marketers are faced with uncertainties similar to those confronting farmers. The December 1989 Minnesota-Wisconsin manufacturing milk price was \$14.93 for milk testing 3.5 percent butterfat. By this December, the M-W will be approximately \$9.80, a decline of over \$5.00 per hundredweight, or one third, from the year earlier price.

Wholesale cheese and non-fat powder prices have slumped by similar amounts. In November, 1989, the average Green Bay Exchange price per pound of cheddar was \$1.64. The current price is \$1.0875 per pound. One year ago, the Chicago area average non-fat powder price was \$1.50 per pound. The current price is barely above the \$.85 per pound support price. These gyrations are only the latest in a series.

Many dairy plants and marketers, seeking to avoid a repeat of last year's Fall shortages, stockpiled manufactured product. This demand, combined with strong overall sales, pushed up Spring 1990 prices as USDA noted. Yet the end result of these inventory building miscalculations was a Fall 1990 price collapse that caught virtually the entire industry by surprise.

Unwanted and overvalued inventory, combined with increased milk supplies (and the expectation of more ample supplies in 1991) drove prices to the floor. Producers, processors and marketers lost millions of dollars in the process. The reverberations from these events will continue to be felt for some time.

One encouraging trend is that in spite of the recent instability in dairy markets, commercial use of milk and dairy products remains strong. Since 1983, sales have risen fairly steadily, in spite of fluctuating prices. In fact, increased consumer sales and reduced government surplus inventories helped provide for the overall price strength of the last two years.

In the 1980s, commercial disappearance increased 1.2 percent annually, compared with a growth rate of 0.9 percent in the 1970s. This translated to a 16.7 billion pound increase in disappearance from 1980 to 1989, as compared with a 10.9 billion pound increase from 1970 to 1979.

Even with recent double digit increases in dairy product prices, the CPI increase since 1982-84 for dairy remains below that for all food. I agree with USDA's conclusion that the recent strength in butter sales is largely attributable to favorable butterfat prices. I further agree that 1991 disappearance, particularly for manufactured dairy products, will be given a

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boost by relatively favorable retail prices. Over the long term, an expanding market for dairy products is the best hope of the U.S. dairy industry. U.S. milk producers recognize that in the 1990s they will have to turn to the marketplace to generate needed income. A growing marketplace can best generate that needed income for dairy producers, processors and marketers.

In an environment of increased risk and ever more demanding consumers, the dairy industry will have to listen to the marketplace very carefully.

I believe that the dairy is positioned for continued growth in the 1990s. As we go along, however, I'll be keeping a close eye on the forecasts of Sara Short and her USDA colleagues. It never hurts to be too careful in this business. You never know what might be around the corner.

In closing, I'll honor a request by making a few brief comments on the subject of regionalism and the dairy industry. I would offer the following observations:

1. Milk and dairy products can and do move freely in inter-state commerce;
2. The cost of transporting cheese, butter and milk powders is small in relationship to the value of the finished products. Finished product can be moved coast to coast at a cost of 5-7 cents per pound. By comparison, the cost of moving raw milk is approximately 3.5 cents per hundredweight per 10 miles;
3. Over time, the value of raw milk for manufacturing uses will not differ between regions by more than the transfer cost between regions of manufactured dairy products;
4. Regions of the U.S. that possess a competitive advantage in dairy production will gain national market share;
5. The price support program provides a national floor under manufacturing (and in practice, all) milk;

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6. The Agricultural Marketing Agreement Act separately provides for the establishment of orders regulating the pricing and marketing of fluid milk, where such orders are supported by producer referendum;
  7. The marketing of fluid milk products, with very few exceptions, occurs on a regional, not a national basis;
  8. Anyone who doubts the validity of the immediately preceding proposition, should be condemned to read and summarize the record of the recent national Federal Order hearing.



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Outlook '91 , Session #C5

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## **THE DAIRY INDUSTRY IN THE 1990'S**

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### **INTRODUCTION**

What can one predict for this complex industry for the next decade? What would an outlook commentator have said on this topic ten years ago in November of 1980? The analyst probably did say that the current policy of 50 cent dairy price support increases every six months would cause significant over-capacity and that there would be a painful adjustment period needed to bring the industry back into balance. Perhaps the commentator could have predicted a \$3.00 per hundred weight support price drop. But the analyst could hardly have predicted many of the specific programs like the invention of industry-wide assessments, refundable assessments, a Milk Diversion Program (MDP), a Dairy Termination Program (DTP), or political prescriptions for the federal milk marketing order system. Predicting the significant increases in dairy demand experienced in the 1980's or that the U.S. dairy industry would, at least for a short time, be competitive on the world markets would have also been greeted with skepticism.

The changes of the last decade were partially driven by macroeconomic events happening in the overall U.S. and world economies. The 1990's is a decade ushered in by unimagined political events in the centrally planned economies and the increasing realization that the U.S. can no longer unilaterally manage its own economy. Given these new factors, what can be said about the next 10 years for the U.S. dairy industry?

### **DAIRY MARKETING AND POLICY INSTITUTIONS ARE SHAKING**

The basic principles on which the U.S. dairy marketing and policy system is based are being buffeted by some broad macroeconomic forces. The four basic principles shaping the operation of the U.S. dairy marketing and policy system include: insulation of the U.S. industry from world markets; regulation to assure orderly milk marketing and distribution; policies for minimum producer income protection and market stability; and pervasive use of group activity in the industry. These principles are embodied in the basic legal and institutional foundations of the industry. Section 22 of the Agricultural Adjustment Act of 1935 provides for import protection. The Agricultural Marketing Agreement Act of 1937 provides for the Federal Milk



Marketing Order System which, along with similar state milk marketing order regulations, provide for publicly sanctioned oversight of the operation and performance of most dairy markets. The Agricultural Act of 1949, including its most recently passed amendment, the Food, Agriculture, Conservation and Trade Act of 1990, provide for the basic dairy price support price mechanisms. And finally, the Capper-Volsted Act of 1922 grants dairy bargaining and marketing cooperatives special privileges which are used to help overall industry operations and producer income.

In the brief time with you today, I would like to concentrate on highlighting some basic forces which will be paramount in shaping the U.S. dairy industry and what might happen to its marketing and policy institutions in the 1990's.

## **SOME BASIC FORCES IMPACTING THE DAIRY INDUSTRY IN THE 1990'S**

### **Will There Be National Dairy Industries?**

A major article in the New York Times of May 6, 1990, titled, "An Icon of the Good Life Ends Up on a Crowded Plant's Hit Lists" questioned the legitimacy of the U.S. livestock industries. In highly developed countries, many are beginning to question the social value of dairy industries. Those questioning the social desirability of livestock industries concentrate on environmental issues such as animal waste run-off, animal odor problems, and the generation of methane gases as examples of the potentially harmful impacts of livestock agriculture. These concerns are coupled with arguments that animal products, including dairy butterfat, are nutritionally harmful to the societies' consumers. As the cartoon in the New York Times article suggests the U.S. dairy industry may, in the 1990's have to answer the question, "Just what is the dairy cow good for?"

The answer to that question lies in the basic ruminant nature of the dairy cow. Because the cow takes cellulose, which has little direct human food value, and converts it into a highly nutritious and desirable food product that can be consumed in many varied forms, it is one of nature's best value-adding species. In addition to producing a highly versatile primary product, the dairy cow produces a nutritious beef byproduct, replaces herself, and generates business enterprises which can be operated on many scales of operation. These factors combine to make a dairy industry a useful tool for rural community economic development for many locations in the world. Dairy industries can facilitate the development of agricultural economies in locations and on land resources that are generally unsuitable for most other agricultural enterprises. Therefore, at various stages of economic development dairy industries become instruments of economic development and are therefore designed and operated with these domestic socioeconomic goals in mind. So a domestic dairy industry is not only an icon of the good life but a vehicle to the good life. As such most world dairy industries are sponsored industries. They often, at least in their initial stages, use infant industry arguments with regard to international trade and competition. Because most individual dairy industries are domestically organized, world dairy trade is an insignificant part of total world production.

As the proportion of the dairy industry's contribution to the U.S. gross national product becomes less and as certain segments of the society question the societal value of animal agriculture, many policy makers question the need or the utility of having a set of U.S. dairy

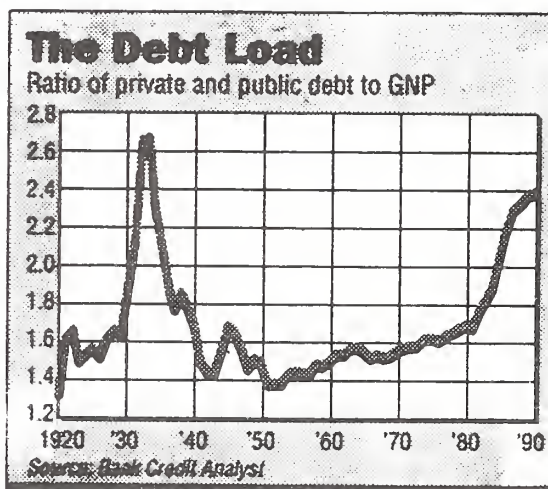
policies which foster and promote a domestic dairy industry. However, as this debate rages in Washington and Geneva, in many U.S. state capitals the critical importance of local dairy industries to the economic and social health of state rural communities is unquestioned. In recent years, development initiatives in several states including Vermont, New York, Wisconsin, Michigan and Minnesota have been proposed or implemented. Continued U.S. sponsorship of a domestic industry is a necessary condition for these economic development initiatives to succeed. If the United States drops or lessens the sponsorship of its dairy industry, will the resulting world dairy markets be devoid of nationally sponsored industries? This question is examined further later in the paper.

### Shrinking Public Funds

The next basic force impacting dairy marketing and policy institutions is best introduced by Figure 1. The 1980's left the U.S. society with a legacy of total economic debt unrivaled since the Great Depression. Total outstanding governmental, corporate and personal debt is about 2.4 times the gross national product (GNP), up from 1.7 times GNP from before the 1981-82 recession. In claims on the national flow of income, debt service occupies a privileged position. The consequences to an individual firm or household of debt repayment default are dramatic. However, default on interest payments on the U.S. national debt would bring down the world financial system.

**FIGURE 1.**

### **TOTAL GOVERNMENTAL, CORPORATE AND CONSUMER DEBT AS A PERCENT OF U.S. GROSS NATIONAL PRODUCT**



Wall Street Journal, November 5, 1990, p. 1.

The current U.S. gross federal debt is around \$3.24 trillion. Net interest payments on that debt are about \$182 billion. Net interest on the federal debt, now the third largest expenditure in the U.S. budget, will likely surpass defense and/or social security (the other two largest claimants) some time during 1990's. Net interest expenditures can not be cut economically. As they grow they will take revenues away from other expenditure categories. Even the "politically" uncuttable categories of Medicare and other "essential" government services will be constrained severely if interest payments continue to grow. Also, private sector debt service requirements make tax increases that directly affect cash flow extremely difficult to pass.

The provisions of the Omnibus Budget Reconciliation Act of 1990 mandating assessments on all commercially marketed milk in the next five years testifies to the fact that there are fewer public dollars for the dairy industry. In the 1990's the dairy industry will have to develop policies and institutional solutions that can operate without access to unconstrained amounts of public money. This suggests that dairy programs of the 1990's will be the responsibilities of the dairy industry itself. What remains to be seen is to what degree the industry can rely on access to public sanctions and enforcement mechanisms to design and operate industry directed programs.

### "Unbounded" Markets

Answering the question, "Where does the dairy industry stop and where does another industry start?" highlights the third basic force impacting dairy markets and policy. Increasingly dairy industries are not bound by physically distinguishable products or markets. The use of nonfood casein imports for dairy type products is a well known example of this basic force at work. The fat substitute or "fake fat" issue is the next major dairy product boundary question. As more food products are built rather than grown or raised, knowing what is a milk and dairy product becomes difficult. By the end of the 1990's advances in genetic engineering, transspecies technologies, and embryo manipulation will bring the dairy industry boundary question directly to milk producing units.

Likewise, we are getting boundless international markets because the world consumer packaged foods markets are becoming dominated by a relatively few international food conglomerates. Executive suites are no longer dominated by dairy industry executives and dairy products are just another part of the firms' product mixes. Nationally sponsored dairy industries complicate milk supply sourcing and distribution patterns. Redesigning dairy markets and institutions will be more and more difficult when what is "the dairy industry" becomes harder to define. This basic factor is one often cited by policy makers who argue that the age of national sponsored dairy industries is over.

### New Roles for Dairy Cooperatives

Recent changes in the economics of dairying and ascendancy of individualism are affecting whether dairy cooperatives can continue their historic roles. World-wide, dairy cooperatives and other forms of group action are fundamental institutions of dairy industries. Cooperatives arose out of the need to readdress bargaining power differences within the market place. In the dairy industry, this usually meant guaranteed fairness on milk tests and weights and assured payment for milk delivered. Over time many producers asked their cooperatives to



guarantee processing outlets for their total production. Also over their history, many dairy cooperatives stepped into the role of providing activities and actions which help the overall efficient and effective operation of the entire dairy marketing system. Activities such as market-wide balancing, rationalization of transportation patterns, etc. have benefitted all market producers and consumers.

As with any voluntary market-wide or industry-wide program, the "free rider" problem becomes preeminent. Free riders are members of an industry who benefit from the activities of the organized group without incurring any expense. The interactions of cooperatives with the federal milk marketing order regulations have been very useful in helping cooperative producers deal with some free rider issues. Recent financial stress, coupled with the structural changes occurring at the dairy production level, have heightened the free rider problem. As such dairy cooperatives enter the 1990's increasingly being asked to justify their importance to not only the dairy system but to many of their members-owners.

Cooperatives achieved many of their current roles by vertically integrating their bargaining activities with assembly and processing. Increasingly, many dairy producers, including many cooperative members, do not view the integration of production and processing as either necessary and legitimate dairy cooperative activities. Many policy makers do not make a distinction between cooperative processors and investor-owned processors. If cooperative members continue to distinguish between their cooperative's production base and its processing base, a whole new set of cooperative roles and operating practices will evolve. If the open-ended public commitment to purchase surplus manufactured dairy products erodes significantly, cooperatives will have to seriously reevaluate their market-wide servicing roles and their willingness to guarantee members a market for all of their milk. The need for cooperatives to redefine their mix of services is the final major force driving change to the overall dairy marketing and institutional structure.

### POSSIBLE CONSEQUENCES FOR DAIRY INSTITUTIONS IN THE 1990'S

The four forces discussed above are not exclusive of those at work. Nor were their full dimensions explored. However, some possible consequences for the traditional dairy marketing and policy institutions become evident. The following are a few possible consequences that one can predict at this point in history. But as the 1980's showed, there will be many more unforeseen consequences yet to arise.

#### Impacts on Dairy Import Protection?

In my opinion, a widely held belief in the U.S. dairy industry is that our current GATT negotiators fully subscribe to the idea that our industry should no longer be under societal sponsorship. In a less widely held belief, many in the U.S. industry believe that on a "level planning field," the industry could be competitive. The operative question is, "Will nations abandon sponsorship of domestic dairy industries and allow international dairy trade to flourish?"

A review of the data in Table 1, suggest to me that the answer to this question is no. Table 1 shows the proportion of world cow milk production in various regional locations. Fully



one-third of the world's production is in the USSR and East European countries. This milk supply is not formally covered by GATT. Even if the developed world phases out sponsorship of their dairy industries through GATT, a whole new set of nations could take up state sponsorship. This is because as these countries politically and economically reorganize many will likely find the dairy industry a convenient vehicle for establishing privately-owned, high-value economic activity in their rural communities. Further pushing this tendency is the political dimension where centrally planned economies are dividing into ethnic or cultural subunits each seeking industries which will produce tradeable output and sources of hard currency. If the inquiries at our international units at Michigan State University are any indication, there is extensive interest in quickly developing improved production, processing, and distribution technology for dairy and dairy products in the USSR and Eastern Europe.

In addition to the state sponsorship for economic development, there will be considerable short-term disruption in international dairy markets. As internal consumption subsidies and production subsidies on various products and industries are relaxed, manufactured dairy products formally directed to domestic outlets are now available for export. In 1989, for example, the per capita butter consumption in West Germany was 7.5 kilograms on half the 15.0 kilograms consumed in East Germany.<sup>1</sup> The highly subsidized consumption in East Germany will likely decline. As the East European and Soviet milk supply works through its adjustments over the next decade, one can reasonably expect to have sporadic, unpredictable and perhaps long-term systematic supplies manufactured dairy products showing up on world markets.

The world can also expect some other new players in world markets as developing countries' sponsored industries succeed. India is an example. Today India is estimated to be the fourth largest producer in the world and is now beginning to export dairy products.

It is very unlikely that there will ever be truly open markets for manufactured dairy products in world trade. Eliminating national sponsorship of the U.S. dairy industry will have little effect on freeing international dairy markets. However, a change in the operation or the existence of Section 22 import quotas would force the redesign of all existing dairy marketing and policy institutions. Whether the U.S. dairy industry has to live without current Section 22 restraints in the 1990's is being decided now. However, the general debate on whether we should have a societal sponsored industry will continue unabated through the 1990's.

### Impacts on Milk Marketing Orders

Open regionalism of the late 1980's has brought about the current debate over the U.S. federal milk marketing order system. However, fundamental macroeconomic forces are really driving change. The rapid ascendancy of cheese as a major claimant of milk supply, the changing structure of the processing and distribution sector, and the changing nature of the definition of milk products are all putting significant stress on the federal milk marketing orders. The concluding national hearings on the federal milk marketing order system will provide the USDA's Agricultural Marketing Service Dairy Division with ample suggestions for redesigning

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<sup>1</sup> "World Dairy Situation," USDA, Foreign Agricultural Service, Circular Series FD 1-90, May, 1990, p. 31.

the federal order system. Irrespective of what the USDA finally proposes, there will be controversy. Also, market evolution will not stop. Orderly marketing will continue to be a vague and elusive concept in the 1990's. Also, California milk supply will likely continue to influence pricing in the federal order system. As a result, the use of national order hearings will likely become a regular feature of the 1990's dairy industry.

#### Impacts on the Dairy Price Support Program

The 1990 Dairy Bill saw the elimination of the open-ended commitment to purchase surplus manufactured dairy products offered on the market. This will produce a fundamental change in the dairy price support policy and all other dairy marketing institutions. The events of the last two years have demonstrated that the dairy markets are inherently unstable without some coordinated and industry-wide manufactured products inventory management system. Some marketing economists will argue that needed market predictability can be achieved by establishing futures and options markets for dairy manufactured products. There will be many strong counter arguments to this alternative policy thrust.

Without open ended public sector support, and with the need for an industry-wide program, dairy policy may well become the responsibility of the dairy industry. The 1990 Dairy Bill solutions of producer assessments to pay for surplus purchases and to reduce the budget deficits, in my opinion, are temporary solutions. The operative provision of the 1990 Dairy Bill is the solicitation of proposals to establish a milk inventory management program. The 1991 Dairy Bill debate has already started. As a veteran of the 1980's debates over the merits and evils of supply management, many of the arguments of the 1990's will be the same. However, given limited access to the U.S. Treasury, the 1990's "inventory" management debate will take on a much different and more serious character.

Furthermore, for the industry to take over national dairy policy, requires access to the enforcement and police powers of the society. Historically, granting societal enforcement power to a particular industry has never been done without considerable debate. This debate will be very contentious because many policy makers believe the time for societal sponsorship of the U.S. dairy industry is over.

#### Impacts on Dairy Cooperatives

The dairy cooperatives are truly caught in a difficult position. They must be proactive in designing and redesigning marketing and policy institutions for the 1990's. But, they are going to have to react to what gets changed. If the U.S. dairy industry is forced open to international competition and to self-help price support policies, dairy cooperatives may well be the only nearly industry-wide institutions left to achieve national level policy coordination. However, freed economic forces will further penalize cooperatives and organizations of cooperatives which take on industry-wide responsibilities. In the 1990's U.S. dairy producers will have to decide whether they will reassert their historic beliefs in cooperative and group action. There will likely be some painful reformulation of individual cooperatives and industry-wide cooperative organizations.

## A DECADE OF INSTITUTIONAL DESIGN

In 1983, Alden Manchester published his classic text titled The Public Role in the Dairy Economy: Why and How Governments Intervene in the Milk Business to explain to the policy makers why there is extensive government involvement in dairy markets. Revisiting his arguments has convinced me that there will always be many forms of public intervention in U.S. dairy markets. Even though the foundations of dairy marketing and policy are under severe stress and critical evaluation, complete industry deregulation, in my opinion, is not very likely.

I do believe, however, that the 1990's will be the time when the industry's basic marketing and policy institutional structure will be recast. When redesigning market institutions, several basic questions must be addressed. First, what market and nonmarket performance outcomes do you want from the dairy industry? Second, to achieve the desired mix of industry performance, what is best provided by private markets versus private markets guided and/or directed by the public sector.

The 1990 Dairy Bill signals the start of the decade of dairy marketing and policy institution design and redesign. Currently on the industry's agenda are: 1) implementing USDA national federal order hearing recommendations; 2) designing an alternative to the Minnesota-Wisconsin price series; 3) designing a new pricing system to recognize multiple milk components; 4) dealing with the consequences of trying to mandate changes in the California state milk marketing order; 5) designing an industry-wide "inventory management" price support program; and 6) digesting the outcomes (if any) of the Uruguay Round of the GATT negotiations.

Dairy marketing and policy institutions touch every dairy production, processing or distribution enterprise. As the industry embarks on redesigning its institutions, I would hope we keep two critical perspectives in mind. First, the U.S. dairy industry is a totally integrated and interrelated market system. Second, any change in one marketing institution will require changing most of the other basic institutions. Recommendations of any one particular study, proposal or action must be evaluated from a total systems perspective. No one can predict the final outcome for where the dairy industries will be at the end of the 1990's. But it is clear to all of us who are observers, students and analysts of the industry, we will be very busy in the years ahead.

**TABLE 1**  
**WORLD MILK PRODUCTION BY SELECTED REGION, 1985 AND 1990**

REGION	1985	1990 <sup>1/</sup>
	Percent of Total	
EC 12 and other Western Europe	31.3	28.2
North America <sup>2/</sup>	17.4	17.0
USSR and East Europe	34.1	34.8
Pacific <sup>3/</sup>	5.1	5.1
India	4.5	5.6
Other Reported Countries <sup>4/</sup>	7.6	9.3
TOTAL VOLUME (1,000 Metric Tons)	419,129	440,006

SOURCE: Foreign Agricultural Service, USDA. World Dairy Situation FD 1-90, May 1990, p. 11.

Notes:   <sup>1/</sup> Estimated  
           <sup>2/</sup> U.S. and Canada  
           <sup>3/</sup> New Zealand, Australia, Japan  
           <sup>4/</sup> Central and South America, Mainland China, South Africa



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OUTLOOK FOR COTTON

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Outlook for 1990/91

U.S. Production and Consumption

In 1990/91, a lower upland cotton acreage reduction requirement (ARP) of 12.5 percent (versus 25 percent last season), good planting and early crop development across much of the Cotton Belt, and a substantial rebound in yield and percent of acreage harvested in Texas are expected to boost production 22 percent above last season's level. Based on November 1 conditions, 1990/91 U.S. cotton production is expected to total 14.9 million bales. However, the larger crop is more than offset by the smaller level of beginning stocks this season and total supply in 1990/91 is projected at 17.9 million bales--down 7 percent from last year.

The tighter supply situation this season is expected to limit domestic mill use. Other factors expected to weigh on current-season mill use are: increased price competitiveness of polyester fiber, continued growth in cotton textile imports, and uncertainty concerning the health of the general economy. U.S. domestic mill consumption of cotton in 1990/91 is estimated at 8.4 million bales, down nearly 400,000 bales from last season, but still historically high. For the first three months of the 1990/91 season, August, September, and October, monthly cotton mill use, at a seasonally adjusted annual rate, was 8.73, 8.74, and 8.66 million bales, respectively.

This season, a substantial decline in polyester prices, coupled with higher cotton prices, are likely to moderate last year's high rate of mill use. During August--October, the cotton/polyester price ratio averaged 1.1, compared with .93 during the first quarter of 1989/90.

Again this season, imports of cotton textile products are expected to supplant domestic output and mill use of cotton. For the period January--August of 1990, cotton textile imports were up 5 percent by volume over similar-period, year-earlier levels. Recent exchange rate movements are likely to encourage

more imports--as the import value of the dollar has increased. (The good news is that cotton textile exports are likely to increase, also).

#### U.S. Cotton Exports and Ending Stocks

U.S. cotton exports in 1990/91 are forecast at 7 million bales, down 700,000 bales from last season. Exports in 1990/91 are being pressured by the smaller initial supply this season and by relatively strong domestic mill demand for available supplies. Also pressuring U.S. cotton exports this season is a much larger foreign outturn.

After a very strong start this season, the pace of U.S. cotton exports has slackened considerably. Monthly upland cotton exports for August, September, and October, on a seasonally-adjusted annual rate basis, were 9.7, 8.0, and 6.9 million bales, respectively. The slowing pace is consistent with expectations of lower exports this season.

Through the first 3 months of 1990/91, cotton prices on the Northern European market, as indicated by the A-Index, were about the same as a year earlier--averaging about 81 cents per pound. U.S. A-type cotton quotes, as indicated by Memphis Territory prices, are slightly more competitive through the first 3 months of the current season--averaging only about 20 points above the A Index, compared with 1.5 cents during the first 3 months last season.

Early-season 1990/91 Northern European coarse count cotton prices also were virtually identical to those of last season. For the first 3 months of the current and past season, the B-Index averaged 77 cents per pound. U.S. coarse-count cotton prices, as measured by Orleans/Texas quotes, are very competitive this season--averaging about 20 points below the B-Index for August through October, the same as last season.

Despite competitive prices, U.S. share of world cotton trade is expected to fall this season to a more normal 29 percent from 32 percent last year. The U.S. export share among individual importers is expected to decline virtually across the board. The notable exception is China--for which the United States is expected to supply about 60 percent of imports, up from 54 percent last season.

Based on current estimates of production, mill use, and exports, ending stocks for 1990/91 are projected at 2.6 million bales--400,000 bales below last season. More importantly, the 1990/91 ending stocks-to-use ratio is projected to fall to .17, the lowest in 40 years.

#### U.S. 1990/91 ELS Outlook

Extra-long staple (ELS) cotton production in 1990/91 is estimated at 397,000 bales, down nearly 300,000 from last season's record production. With beginning stocks of 207,000 bales, total supply this season is estimated at 604,000 bales.

Total demand for ELS cotton is expected to continue strong this season.

Domestic mill use is estimated at 75,000 bales, while ELS exports are expected to reach 425,000. With the continued strong ELS demand and smaller crop, ending stock levels are estimated near 100,000 bales, one-half of last season's level.

#### Foreign 1990/91 Production and Consumption

Foreign cotton production in 1990/91 is estimated up 9 percent to 71.8 million bales, second only to the record 76 million produced in 1984/85. Production rose primarily in response to the very low ending stocks-to-use ratios and high prices at the end of last season. Some of the increase was caused by larger area which is projected up 2 percent; but more of the growth reflects the forecast 4-percent gain in foreign yields.

Larger production is expected in India, Pakistan, the Soviet Union, China, Australia, Brazil, Argentina, Paraguay, and Egypt. China continues to be the largest producer; its output is forecast to exceed last year's poor crop, but by less than had been earlier anticipated. Area was reduced again in the Soviet Union, but yields are up. India is expecting its second consecutive record crop.

Despite the continued high prices, consumer demand remains strong. Foreign consumption is projected at 78 million bales, just under last season's record.

Large consumption gains are again expected in Pakistan, India, and Brazil, where use has been expanding rapidly. Much of the drop in consumption will occur in Eastern Europe, which is struggling to find foreign exchange to purchase cotton. Some East Asian textile producers also are expected to cut use because of rising competition in their own markets from imported textiles and because of currency appreciation against the dollar reducing textile export competitiveness. China's consumption is forecast to be down slightly.

Foreign 1990/91 imports are projected at 24.2 million bales, down slightly from 1989/90, but still relatively high historically. Foreign exports are expected to rise to 17.3 million bales, but remain well below the 19.7-million-bale record, as tight beginning stocks restrict potential export gains. A limited recovery is projected for low foreign ending stocks; and stocks-to-use ratios are expected to remain second to last season's record low.

#### Foreign ELS 1990/91

According to ICAC estimates, production of extra long staple cotton in 1990/91 on balance will be off slightly from 1989/90. Large declines are expected in Sudan, the United States, Peru, and Israel in response to lower prices. Sudan also has had exceptionally poor weather this season, cutting their crop sharply.

But, more output is expected from the largest producers--Egypt, the Soviet Union, and India. Output is also forecast up in China. Egypt raised yields by successfully controlling a mold that had been depressing yields during the

last two seasons. A more normal ELS area was planted in the Soviet Union this season and yields also rose. India's yields continue to expand.

With a smaller crop, exports are also expected to drop and supplies to tighten again. The U.S. will be the largest exporter for the second consecutive year. Exports from Sudan, the Soviet Union, and Israel are projected off sharply. Soviet exports are off because of internal confusion about new exporting regulations. Egypt's exports are expected to rise, but India is more likely to export additional upland than ELS varieties.

### Farm Bill

The current crop year marks the final season of applicability of the 1985 Food Security Act. The changes that have occurred in the domestic cotton industry over the last 5 years may be best highlighted by examining the circumstances that influenced the 1985 Farm Bill and where we stand today. The 1985 Farm Bill was developed when the cotton market was characterized by falling mill use, sharply lower exports, rising stocks, growing textile imports, and low farm prices. Currently, the cotton market is characterized by rising mill use, sharply higher exports, falling stocks, and higher farm prices.

Few of the earlier conditions persist with the exception of increasing cotton textile imports--and even they are not increasing at the rapid pace of earlier years. Too, increases in cotton textile exports are assisting domestic mill use.

The dominant considerations in formulating a farm bill in 1990 were namely to; (1) preserve the advances under the 1985 Farm Bill, and (2) provide producers with greater planting flexibility. Under the 1985 Farm Bill, program rigidities prohibited producers from responding to market conditions. Planting flexibility provisions in the 1990 Farm Bill allow for producer planting in response to market signals rather than program benefits.

Flexibility provisions designate two types of flexible acreage:

- (1) Normal flexible acreage (NFA)--15 percent of the current program base; and,
- (2) Optional flexible acreage (OFA)--an additional 10 percent of program base.

Unless the Secretary specifically prohibits, producers may plant their flexible acreage to any crop except fruits and vegetables. Up to 25 percent of a participating producer's crop base may be used as flexibility acres. In general, a producer may plant up to 25 percent of his cotton base to another crop without losing cotton base. The first 15 percent, (NFA), will not be eligible for deficiency payments, even if planted to cotton. If another crop is planted on a producer's remaining flexibility acres, the producer will lose cotton deficiency payments on the extra acres.

Producers may also plant cotton on up to 25 percent of another program crop base without jeopardizing cotton loans and payments. Cotton planted on the flexibility acres of another crop, while not eligible for deficiency payments,



is eligible for loans whether or not a producer participates in the cotton program.

Among other provisions:

- o target prices for 1991-95 not less than the 1990 level--72.9 cents/lb.
- o paid land diversion of up to 15 percent must be offered if projected carryover is greater than 8.0 million bales, with payment rate not less than 35 cents/lb.
- o preliminary ARP announcement on November 1 and a final ARP announcement on January 1
- o designates 24 counties in S. Texas as early planting area in which producers may elect to conform to the ARP announced on November 1 or January 1, if the Secretary determines that the producers in those early counties would be disadvantaged by a change in the ARP
- o ARP can be set between 0-25 percent, inclusive
- o mandates that ARP requirement be set to achieve an ending stocks level of 30 percent of projected offtake

Outlook for 1991/92

#### U.S. Cotton Offtake in 1991/92

U.S. cotton consumption in 1991/92 is expected to continue relatively strong. Mill use may remain near recent historically high rates based on adequate cotton supplies, higher polyester prices in response to higher oil prices, and continued consumer preference for cotton fiber products. Total U.S. cotton mill consumption in 1991/92 could range from 8.0 to 9.0 million bales, depending to a large extent on the health of the general economy.

Exports of U.S. cotton in 1991/92 may improve modestly over the current season's supply-limited level. With expected competitive U.S. world market prices and an improved stock situation, U.S. exports in 1991/92 could range between 6.0 to 8.0 million bales. Based upon estimated mill use and exports, total offtake in 1991/92 may range from 14 to 17 million bales.

#### U.S. Cotton Production and Ending Stocks in 1991/92

The 1991/92 outlook for U.S. cotton production is clouded by an as-yet, unannounced acreage reduction requirement. However, basic cotton program provisions for 1991/92 suggest substantially larger production. Specifically, the requirement that the acreage reduction program be set so as to attain ending stocks equivalent to 30 percent of prospective offtake will likely result in a lower ARP level in 1991/92 than in the current season and correspondingly larger production. Too, the flexibility provisions of the new farm bill are likely to result in increased cotton plantings as producers respond to what many perceive as market conditions which favor cotton over competing crops in their production areas.

With ending stocks for 1990/91 projected at 2.6 million bales and projected offtake in 1991/92 estimated to range between 14 to 17 million bales,

production will need to exceed offtake in 1991/92 by 1.5 to 2.5 million bales to elevate the ending stocks-to-use level from the projected .17 in 1990/91 to .30 in 1991/92.

The potentially lower acreage reduction program in 1991/92, versus the current season's 12.5 percent, suggests program enrollment in 1991/92 will likely about match the current season's 87 percent. Correspondingly larger planting of program acres, together with anticipated cotton sowings in response to flexibility provisions and market conditions, suggest that planted acreage will increase in 1991/92. With potential yields ranging from 550 to 625 pounds per planted acre, 1991/92 acreage planted to cotton will likely range between the 12 to 16 million acres needed to achieve a 1991/92 ending stocks-to-use of 30 percent.

#### U.S. 1991/92 ELS Outlook

The outlook for ELS cotton in 1991/92 is one which returns to more normal trends. The Secretary of Agriculture is expected to announce major provisions of the 1991 ELS cotton program by December 1, 1990. Notwithstanding the 1991 program provisions, continued strong demand will likely dominate the 1991/92 outlook.

In 1991/92, ELS planted acreage could expand 25,000 - 75,000 acres from this season's current level to more than 250,000 acres. Many producers may elect to return to ELS production 1991 in lieu of upland since ELS/upland price ratios are favoring ELS production.

ELS cotton production in 1991/92, assuming trend yields and normal abandonment, could range from 475,000 to 525,000 bales. With ending stock levels for the current season estimated at 94,000 bales, total ELS supplies in 1991/92 could range from 570,000 to 620,000 bales--near the current season's historically strong levels.

#### Foreign 1991/92 Production and Consumption

Because of the continued low stocks-to-use ratios, foreign producers are likely to raise production again in 1991/92. Following trends, more yield growth than area growth is again anticipated as foreign area expansion is limited by the high cost of additional irrigation.

India, Pakistan, the Southern Hemisphere producers, and the French-speaking countries of West Africa seem most likely to raise output, even though they are producing records or near records this season. India will continue expanding irrigated area, raising yields. Pakistan's yields are rising because of continued improvements in cropping practices. In the Southern Hemisphere and French-speaking West Africa, as long as cotton prices continue strong, cotton seems likely to remain attractive relative to competing crops.

China probably will try again to increase incentives relative to other crops in order to achieve production that at least matches its consumption levels.

Soviet area likely will be reduced again, so production there will rise only if yield gains remain better than average.

Assuming no worldwide recession and no substantial impact from GATT, much the same foreign consumption pattern is expected in 1991/92 as in 1990/91. On balance, use is likely to remain strong. Increases are expected in major producing countries, coupled with further reductions among key importers. China's use may grow, primarily because of population increase. Growth of use in Pakistan and India will continue to reflect expanding textile production. Use in western Europe could rise slightly, reflecting East Europe's rising textile demand. East Europe's current problems will continue; no gains are expected there. Consumption in East Asia will depend highly on the economic situation in the U.S. and the EC. Competition from manmade fibers is not expected to be an important factor in 1991/92, as higher oil prices this year should keep man-made fiber prices high relative to cotton.

Trade demand is most likely to continue at its present level, reflecting both the continued relatively tight supplies and the slightly reduced importers' use. If consumption and trade do not rise significantly, however, the gains in production should be sufficient to improve the ending stocks and stocks-to-use ratios somewhat.

#### Foreign ELS 1991/92

Expectations for world production gains in ELS are also positive. For 1991/92, Egypt is optimistic it can again raise ELS production. Other producers also may be encouraged by the recovery of ELS prices in 1990/91.

If production rises, exports probably will rise too. Some gains in trade are likely because of rising consumption as well. Demand for ELS cotton is growing slowly in the EC and Japan as they gradually switch to producing higher quality textile products using more ELS cotton in order to remain competitive with rising textile imports in their own markets.

With a larger crop, Egypt would be expected to raise exports, perhaps at the expense of another exporters' market share. Soviet exports would be expected to recover. And, with back-to-back large crops, India is also likely to export more ELS cotton again.

#### World Cotton in the 1990's

Over the long-term, both world cotton production and consumption will continue to trend upward. But, if currently low stocks are to be replenished and stocks to continue growing with consumer demand, then slightly more production than consumption growth will be necessary. Both production and consumption are projected to range between 100 and 115 million bales by the year 2000 with production slightly exceeding consumption.

World production historically has risen about 2 percent annually. But, foreign production growth since the late 1970's has been stronger than the

long-run historical average. This trend is expected to continue in the 1990's as improved foreign cultivation practices become more widespread.

Both area and yield increases are expected to provide the impetus for production growth. In contrast to its relatively flat historical trend, foreign area is projected to rise gradually as a major new irrigation project in southern Turkey opens. Foreign yields also will continue upward at a pace faster than the long-run historical rate as some foreign producers expand cotton use and reduce exports, while others, whose use is small, try to fill the export demand. Yield growth may approximate the 3-percent average yearly growth of the past 15 years.

China almost certainly will continue to be the world's leading producer. The volatile situation in the Soviet Union is expected to temper production growth there; although yields probably will show some gains during the decade, continued area reductions are likely for at least a few more years. Turkey's yields and output should begin to rise because of a sharp increase in irrigated area in the south as the major new irrigation system now under construction gradually begins functioning. Producers in the Southern Hemisphere and the French-speaking countries of west Africa are also expected to continue expanding cotton output and exports.

World cotton consumption in the 1990's will continue to be pushed upward by the positive growth forecast for the world economy and continued population expansion. As long as cotton prices remain competitive with man-made fibers, cotton should be able to maintain its global market share of about 50 percent. However, the pattern of cotton consumption and trade will depend in part on the outcome of the current GATT negotiations both in agriculture and in textiles, which could shift consumption and trade in both cotton and textiles from one country to another.

Assuming current trends continue and are not upset dramatically by GATT changes, China is expected to continue as the largest consumer. Pakistan, Turkey, Brazil, and Mexico likely will further reduce cotton exports in favor of raising consumption and exporting textiles. Although India's textile exports are expected to continue rising, it may also become a steadier exporter of a significant quantity of cotton. Long-term prospects for cotton demand in the Soviet Union are particularly uncertain. If the Soviets are able to reorganize industry rather quickly, consumption would be expected to rise sharply and exports decline; if reorganization stagnates, use may continue to expand quite slowly.

Among the importers, the changing situation in Europe is the most interesting. Sharp short-term reductions in cotton use in Eastern Europe are already apparent; but a longer-term rebound in cotton demand is likely, at least in some countries as they use the textile industry to earn much needed foreign exchange for further economic development. During the period that East Europe's demand for cotton is low, the rest of Europe is providing an increasing amount of East Europe's pent up textile demand, raising short-term western European cotton consumption. But, in the long run, expanding East European textiles will seek markets, primarily in western Europe, cutting into



western cotton demand. Current trends also suggest consumption among major East Asian importers will drop during the 1990's, while emerging Southeast Asian cotton importers are likely to continue expanding use.

#### U.S. Cotton in the 1990's

In the 1990's, the U.S. cotton industry is likely to continue to benefit from the 1980s' movement toward natural products. However, the big gains of the 1980s are not likely. This is primarily because the industry had so far to go at the end of the 1970s--that big gains were possible. At the beginning of 1981, cotton's share of total fibers consumed on the cotton system was 58 percent. Currently, cotton's share is near 73 percent. Further gains are likely to be tempered by cotton's already-high share.

For instance, in a recent study which examined 15 major end uses of cotton, which represented 80 percent of 1989's annual total mill use of cotton, continuation of the 1982-89 growth trend would result in 100 percent market share for cotton in 9 of the 15 markets by the year 2000. Clearly, this trend will not persist. However, for some end uses, such as towels and washcloths, cotton already dominates the market. Future growth of cotton use in these areas will be limited by market growth.

There are bright horizons for cotton use, also. During the 1980's, U.S. cotton producers poured nearly \$200 million into research and promotion of cotton through per-bale assessments on production. New legislation potentially may increase producer contributions by 50 percent and provide for additional funds from foreign textile producers who have in the past benefitted from market expansion.

Domestic mill use of cotton is also likely to benefit from increasing exports of cotton textile products. Through the first 8 months of calendar year 1990, the cotton content of U.S. exports of cotton-containing textile manufacturers was 345 million pounds (roughly 719,000 bales), up 31 percent (173,000 bales) over the comparable year-earlier level. Exports of yarn, thread, and fabric increased 41 percent; apparel, 20 percent; and home furnishings, 69 percent.

The combined effect of these forces is likely to be sustained growth in domestic mill use of cotton in the 1990s. Domestic mill use levels of 9.0 million bales by 1995 and 10.0 million bales by 2000 are clearly attainable.

U.S. raw cotton export prospects during the 1990's are similarly bright. Assuming competitive U.S. prices and adequate supplies, a growing export market for domestic cotton is assured. New planting flexibility, which will allow producers to expand or contract production as the market dictates, should militate against the large fluctuations in stocks that have at times restricted U.S. exports. These factors should produce a more stable and higher level of exports in the next decade--with U.S. cotton annual exports of 7--9 million bales in the 1990s.

During the next decade, larger projected offtake will likely require additional cotton plantings. Acreage may continue to expand modestly in the

Delta and Southeast during the next few years as cotton's prospects brighten-- and if current grower dissatisfaction with some competing crops persists. The necessity for larger acreage could be mitigated to a degree if recent progress in the development of Heliothis resistant varieties of cotton continues to fruition. Cotton plantings during the 1990s may average 12-14 million acres, annually.

#### Summary

In summary, by the end of the decade, world cotton production and consumption are projected in the range of 100-115 million bales. Stocks should rise modestly, meeting consumption needs and stocks-to-use ratios should return to more normal levels. Major changes in the Soviet Union and East Europe can be expected to alter consumption patterns, as can the outcome of GATT agricultural and textile negotiations.

In the U.S., both domestic mill use and exports are expected to increase during the next decade. Growing cotton demand, coupled with cotton program provisions which should facilitate producer response to market signals, is likely to push cotton plantings higher. By the end of the decade, both production and offtake may approach 20 million bales.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
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Outlook '91, Session C-6

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## COTTON IN A WORLD OF CHANGE

Kevin McDermott

Vice President-Economic Research, Calcot, Ltd.

In the past year there have been many changes in the world in which we live. Eastern Europe has become a market opportunity, while conflict looms over the Middle East. Recession fears abound at home, and economic instability in Russia challenges recent changes made there. While new farm legislation provides opportunities for producers to respond to market signals, it also reduces support. GATT talks may open foreign markets for U.S. products or cause loss of domestic textile markets to foreign competition. A market outlook is a snapshot view of our market. In this talk I hope to present the movie version, by examining some underlying trends that affect "Cotton in a World of Change."

The tight fundamental situation presented by the previous speaker indeed reflects current supply and demand indications. However, market dynamics may change the final results. At current price levels, demand is stronger than supply; however, prices may rise to ration the two into equilibrium.

Domestic consumption is exceeding expectations, averaging 8.7 million bales over the first three months of the marketing year. While business has not been profitable, consumption has continued. This divergence from expectation shows dramatically the importance of monthly readings on the U.S. mill situation. Loss of this report will accentuate the volatility of our market. Facing a mild recession, total U.S. fiber consumption will turn down this year. Still, mill consumption of cotton should reach the 8.4 million bale level projected.

Export commitments have already exceeded 6 million bales and appear poised to exceed 7 million bales. Committed sales are at the highest level since 1979 for this point in the season and would require only 36,000 bales sold per week for the remainder of the season to reach a 7 million bale estimate.

The question yet to be answered this season is whether ending stocks can decline to 2.6 million bales. Ending stocks must last until new crop cotton becomes available, approximately October 1. Domestic mill usage during August and September will be about 1.5 million bales. Exports are expected to require 800,000 bales. U.S. mills need around 500,000 bales in inventory. Assuming a perfect match between desired qualities and available supply, at least 200,000 bales will be needed of new crop before October 1. A normal distribution of qualities may require over 500,000 bales. While anticipations

are that acreage will increase substantially in the early growing areas, this still places importance on the transition to new crop. I believe that the market may try to ration demand so that the carryover is closer to 3 million bales.

In the world market the growth of world cotton production during the 1980's was impressive. The average annual increase in production was 1.9 million bales. However, world cotton consumption grew even faster. In the last ten years it has been growing about 2.4 million bales a year. The decade of the 1990's may see firm prices as these two trends must be merged. Either supply will need to increase faster than it has, or demand will be restricted. Already world cotton stocks have been reduced to the tightest level ever.

Trying to predict where change will occur in the world cotton market is a difficult task. In looking at trends in individual countries, perhaps the most significant could be the Soviet Union. While no one knows whether the Soviet Union will indeed survive or be transformed into independent entities, their cotton production has been changing. Since 1987 cotton acreage in the Soviet Union has decreased 11%. Water concerns, including salinity and the disappearance of the Aral Sea, as well as a desire to move away from the cotton monoculture will continue this trend. Projections now call for acreage to fall 30% from its peak. If this trend develops, Russia may no longer be a significant factor in the world market for raw cotton. It appears that by 1995 Russia may be producing primarily for their internal needs.

The Berlin Wall served to isolate Eastern Europe from the Western world. Its destruction this past year symbolically initiated the dismantling of the governments throughout the region. These countries face tremendous economic, as well as political, challenges. Their textile industries are a crucial component of their total industrial production. Not only are they a major employer, but also they earn valuable foreign exchange. Over the last ten years mill consumption has declined from over 3.5 million bales to under 3 million. Outdated and inefficient machinery has been shut down. Democratic freedoms now allow consumers to demand higher quality products. This trend, along with the barter arrangements with the Soviet Union, has limited demand for U.S. cotton in Eastern Europe.

These trends seem about to turn. Russia has indicated that they will be trading in hard currency. Enhancing the standard of living will require improved spinning capabilities. I look for significant improvements in mill consumption of cotton in Eastern Europe over the next ten years.

China will continue to play a crucial role in our changing cotton world. After the monster crop produced in 1984 of over 29 million bales, China became a net exporter of cotton. Surpluses remained until 1988. Last season they again became a net importer of cotton. This year they have already purchased at least 1.1 million bales of U.S. cotton and may be a net importer of over 1 million bales worldwide. Consumption has been restricted by the lack of available cotton in China. They have attempted to increase prices to the grower, but acreage has not grown as swiftly as desired due to competing



crops. I anticipate that while production may increase over current levels, China will remain a net importer of cotton.

In 1987 there was much concern about the competitiveness of U.S. cotton. This was due primarily to the extremely competitive pricing of Pakistani cotton. This was understandable if you examined the available exportable supply of their cotton. Since 1987, Pakistan's production has continued to increase, but at a slower rate than over the early 80's. However, their consumption has increased more rapidly. As a result, we have not seen as much pressure on world prices from Pakistan as their exportable surplus has declined.

International trade over the next decade may be influenced by negotiations on the General Agreement of Tariffs and Trade or GATT. U.S. cotton growers should watch carefully these talks as they may require change to current legislation. Although it appears that the talks are stalled at the present time, most negotiation takes places against deadlines. The ministerial talks next week may be such a deadline, while the March expiration of fast track authority granted by Congress surely is. One concern that should be addressed is the need for a 15 year phase-out of the MFA. The American Textile industry believes that we need a long-term transition to any new rules, as well as a means of enforcing those rules. While it is difficult to predict whether we will have any agreement, much less what form a final agreement may take, it is clear that these talks will influence the overall trade structure of the world cotton and textile industries.

In our world of change perhaps there has been no greater recent change than the passage of the 1985 Food Security Act. This allowed U.S. cotton to be competitively priced. Not only did exports increase, but we saw a significant growth in U.S. mill consumption. The passage of the Food, Agriculture, Conservation and Trade Act of 1990 indicates that the U.S. is committed to participating in the world cotton market. Not only has the marketing loan been retained, but competitiveness has been assured through a three step system. First, the Secretary is granted the discretion necessary to make U.S. cotton competitive. If that fails to achieve the desired result, the Secretary would be required to issue handler certificates. The final step would be to allow additional imports if U.S. mills remain at a disadvantage.

Another key change in the 1990 Farm Bill was the additional ability granted for farmers to respond to market signals. Flexibility was given through the prohibition on cross compliance. In addition, growers will be able to shift up to 25% of their base acres to other crops and still protect their base. On 15% of their base acreage, however, growers will not receive deficiency payments, the so-called triple base.

Another important aspect of the new legislation is the target carryover level established. The Secretary is now required to set the Acreage Reduction Program at the rate necessary to achieve a carryover stocks to use ratio of 30%.

Given the new Farm Bill, attention turns now to the prospects for the 1991 season. Scott Sanford has given you some general thoughts in broad ranges for

next season. I will stick my neck out further and make some more specific guesses. The first question is at what level will the Secretary establish the A.R.P. With the target carryover of 30%, we must look at supply and demand projections at various levels. Before looking at specific regions, let's examine the aggregate U.S. figures. I expect that a 10% A.R.P. will produce an upland crop of about 16.3 million bales. For every one percent higher or lower, the crop will change by about 100,000 bales. Demand is expected to remain strong, as suggested by the previous speaker. I look for upland demand to reach 14.5 million bales if our supply is 18.8 million. There would be small changes in demand if more or less cotton is produced. Given these estimates, I anticipate that the Secretary will announce a 10% set aside program. Given the late passage of the bill, announcement of this will be later than needed, especially in the Far West. We urge that the initial announcement be made as soon as possible.

Assuming a 10% A.R.P., growers will need to evaluate their prospective plantings. There is a great deal of uncertainty in estimating the 1991 crop because of the introduction of the flexibility provisions. The range of possibilities available to the producer makes guesstimates dangerous, but I will make projections as a starting point for discussion.

The Southeastern U.S. will show the largest percentage increase next season of 12%. Planted acreage of 1,275,000 acres will be up nearly 140,000 over last season. About 100,000 of these acres may shift into cotton due to the flexibility provisions.

While soybean acreage cannot be shifted into cotton with the flexibility provisions, there will still be about 200,000 acres that will be shifted. Total Delta acreage of 3.83 million will be up 9% from this year.

In the Texas/Oklahoma region, we may see acreage grow by 7%. Much of this will occur from a 300,000 acre shift due to the flexibility provisions. A significant area of growth may be the early growing regions of South Texas.

The smallest percentage increase will occur in California and Arizona. The poor crop this season in Arizona will make financing difficult for some growers. In California, the flexibility provisions only mean that a grower can not grow cotton on wheat acres due to lack of water instead of not planting wheat on those acres. While there may be a little increase in acreage, assuming some improvement in water availability, it may only be 3%. A 50,000 acre increase will bring the Far West acres to 1.5 million.

The Pima situation is also uncertain. A crop disaster in Arizona will cause a further reduction next year. Acreage may decline by 30%. However, this decline is expected to be more than offset by an increase in the San Joaquin Valley. Overall, Pima acreage may increase by 20,000 acres to 250,000 although, if anything, this may be on the high end of possibilities.

Overall, the U.S. may plant 13.3 million acres, a 7% increase over this year and the highest level since 1981.

While even projecting acreage is dangerous, let's assume normal abandonment and average yields and estimate the 1991 crop. The total crop may reach 16.8 million bales, the largest crop since 1937 and the fourth largest in history.

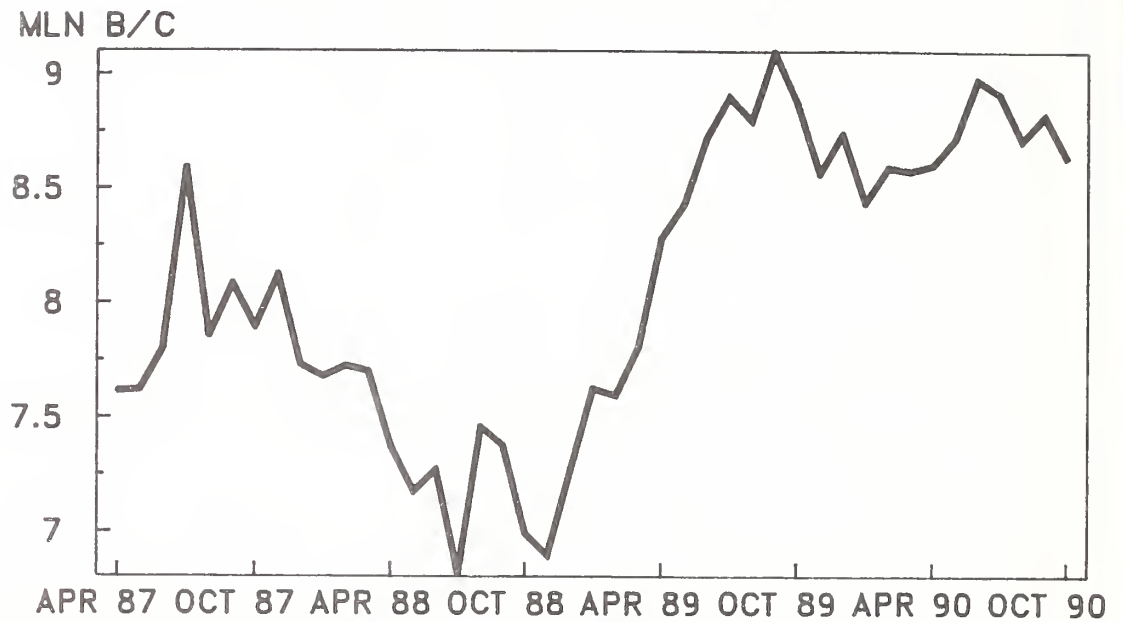
Being that I am from California, I would like to take a few minutes to discuss the situation out there. We are beginning our fifth year of drought. As a result, our reservoirs are at only 31% of capacity as of the beginning of November. This is about 52% of normal. Even with normal rainfall from this point forward we will still see reduction in the deliveries of water this coming season. Currently we would expect that deliveries will be cut 62% from contracted amounts. This compares to 50% last year. Last year was only the second time that both the State and Federal projects had to reduce deliveries. These reductions will force growers with ground water availability to increase pumping. However, those areas have seen river run-off reduced even more than the northern water storage areas. Overdraft has caused some pumps to fail and has reduced water efficiency. In areas where ground water is not available, acreage was cut last year. A grower with limited water will use that water first for permanent crops, followed by high value vegetable crops. Last on the priorities is row crops, such as cotton. A 62% reduction may mean a 100% reduction in cotton for some producers. Without an extremely wet year, we will not see the acreage figures I suggested earlier. In fact, production may show instead a significant decline in the San Joaquin Valley.

Environmental concerns have led some to challenge agriculture in the United States. In the 1990 Farm Bill there were programs such as Swampbuster and Conservation Reserve that again focus the attention of farmers on future changes resulting from environmental concerns. In California, a major initiative, Big Green, was on the November ballot. This would have banned the use of chemicals without scientific evidence of their danger. If that issue had passed, our farmers would have had plenty of water as they would not have been able to economically produce anything. A major campaign against Big Green succeeded in turning away the challenge this time. However, growers must be cognizant of these concerns, as they will re-surface if farmers abuse the trust placed in them as custodians of the soil.

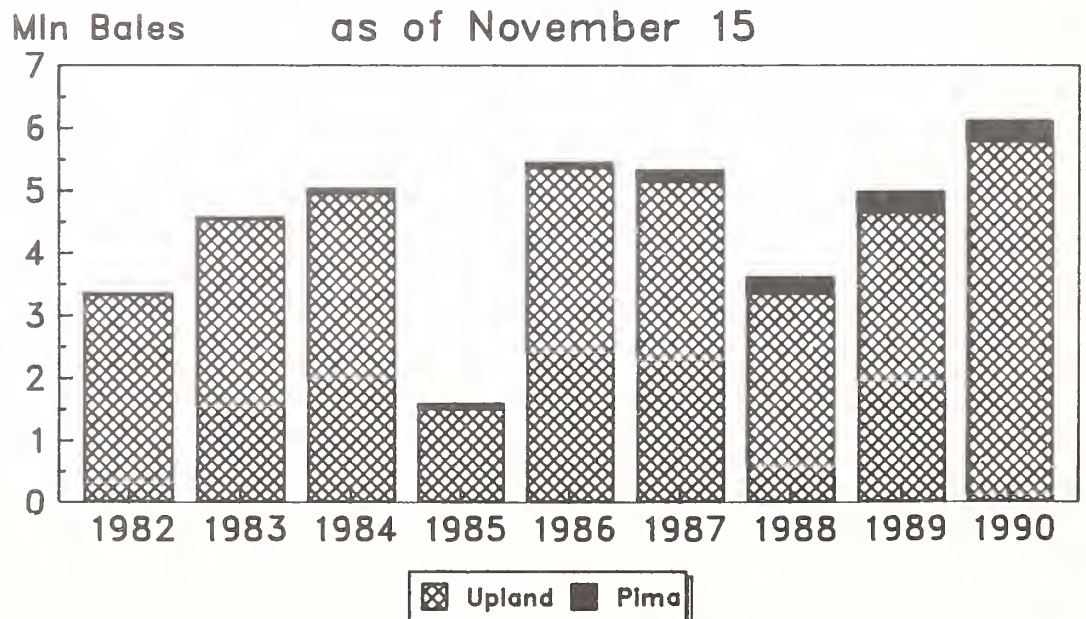
As we look at cotton in our world of change, I see many opportunities for U.S. cotton producers. Despite increases in production, it appears that demand for their product will remain strong. Marketing will remain extremely important as new markets become important. We will need to be competitive not only with price, but with quality as well. Such tools as High Volume Instrument Classing may help give us an advantage. As growers begin to look at the cotton program in 1991, they will notice significant changes, yet the basic concepts have remained intact. While it will be confusing at first, they will discover that the changes have given them more options. Growers in California may be frustrated, as they wish to react to the changing cotton situation but lack the water to do so. Indeed, cotton will remain important in our world of change.



## U.S MILL MONTHLY CONSUMPTION SEASONALLY ADJUSTED ANNUAL RATE



## Export Sales

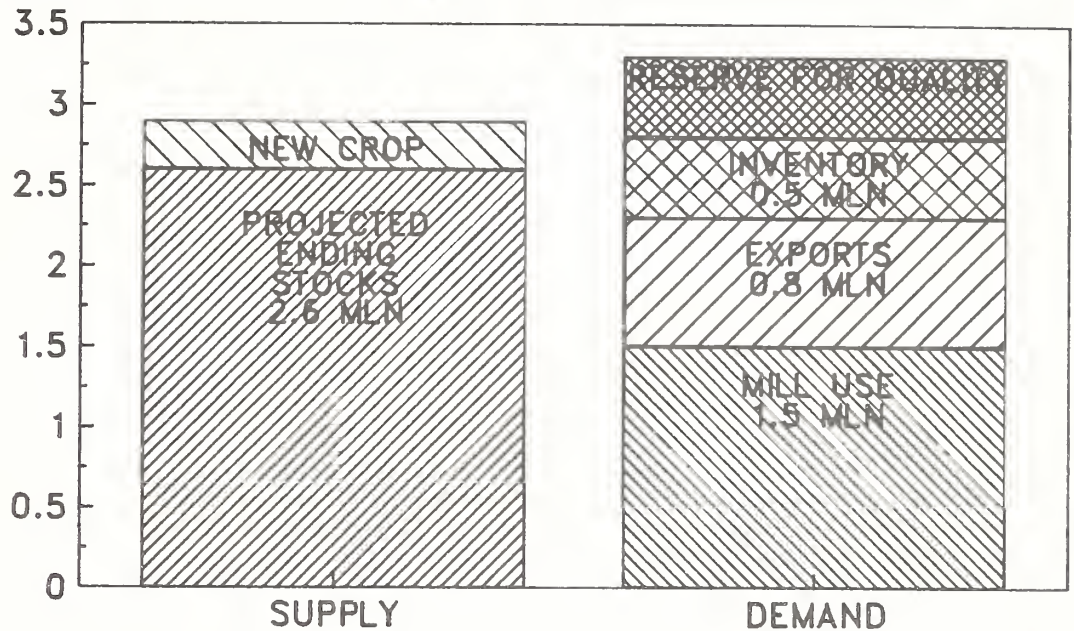




## ENDING STOCKS

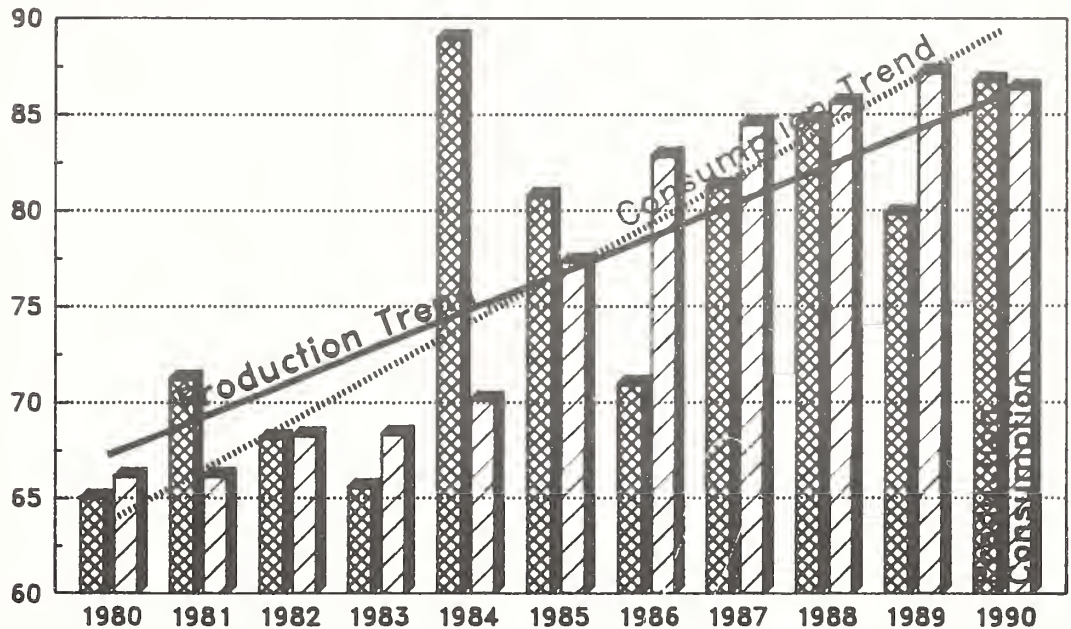
MLN BALES

TRANSITION TO OCTOBER 1

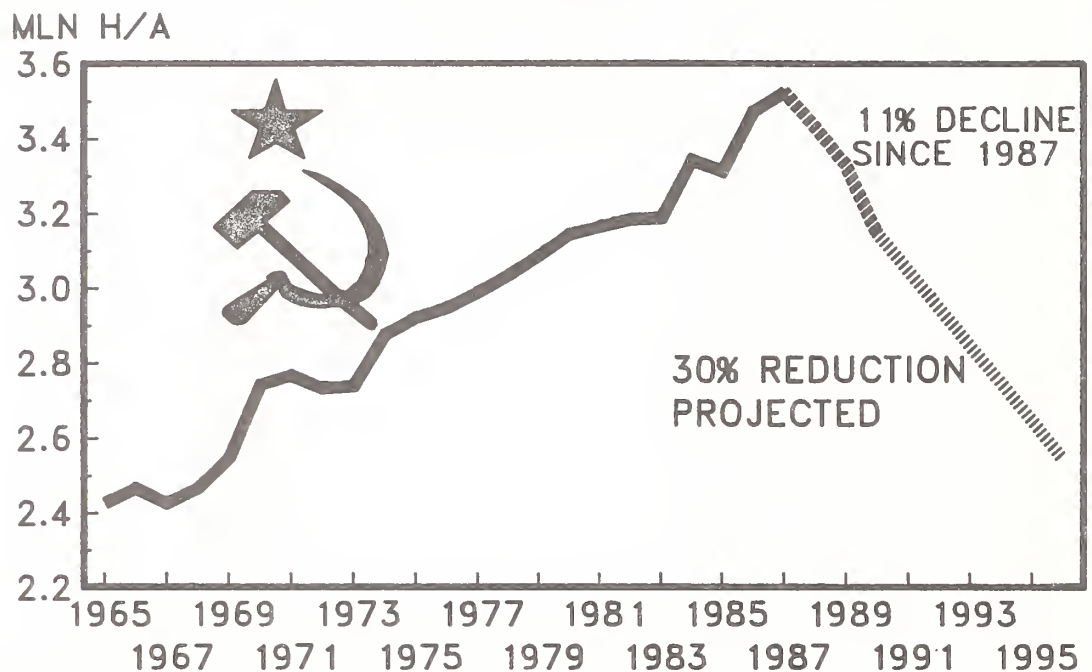


## WORLD COTTON PRODUCTION / CONSUMPTION

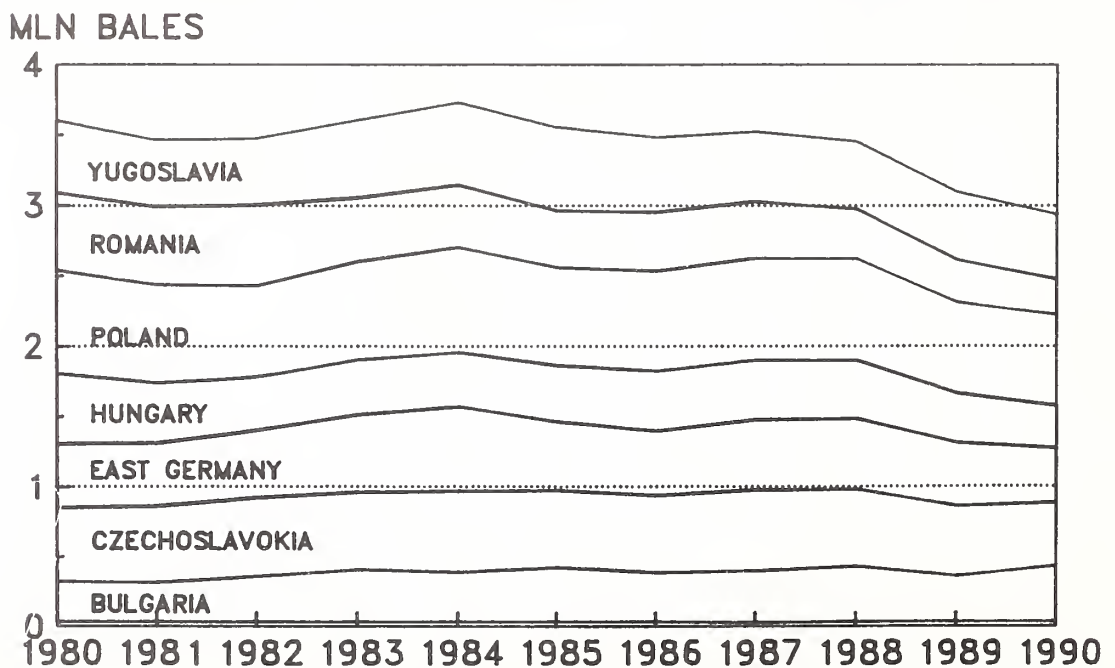
Million Bales



## USSR HARVESTED ACREAGE

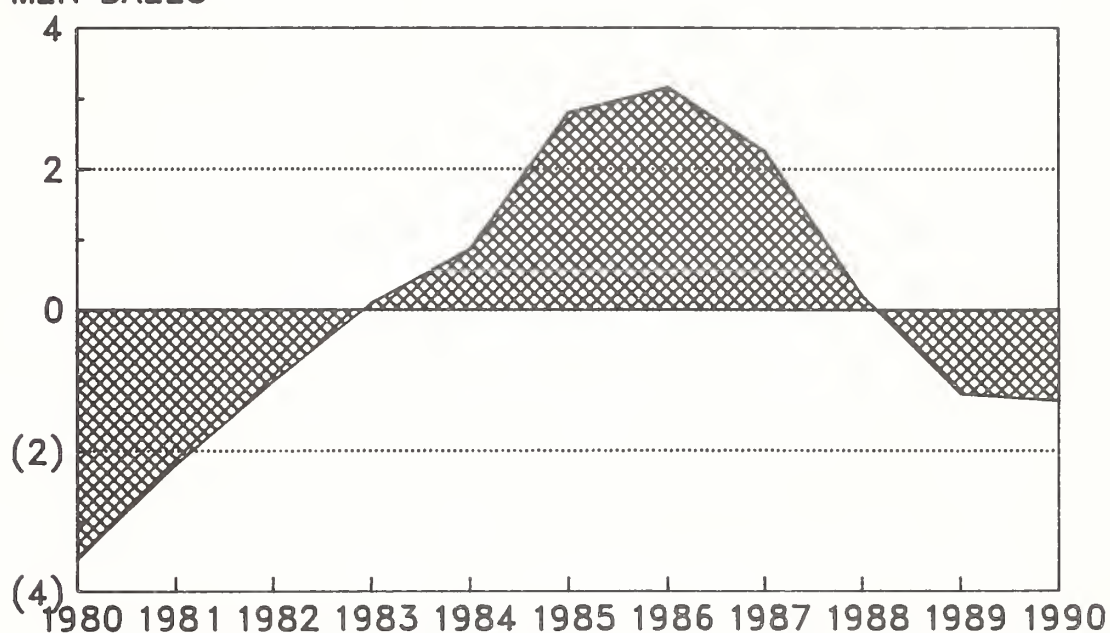


## EASTERN EUROPE MILL CONSUMPTION



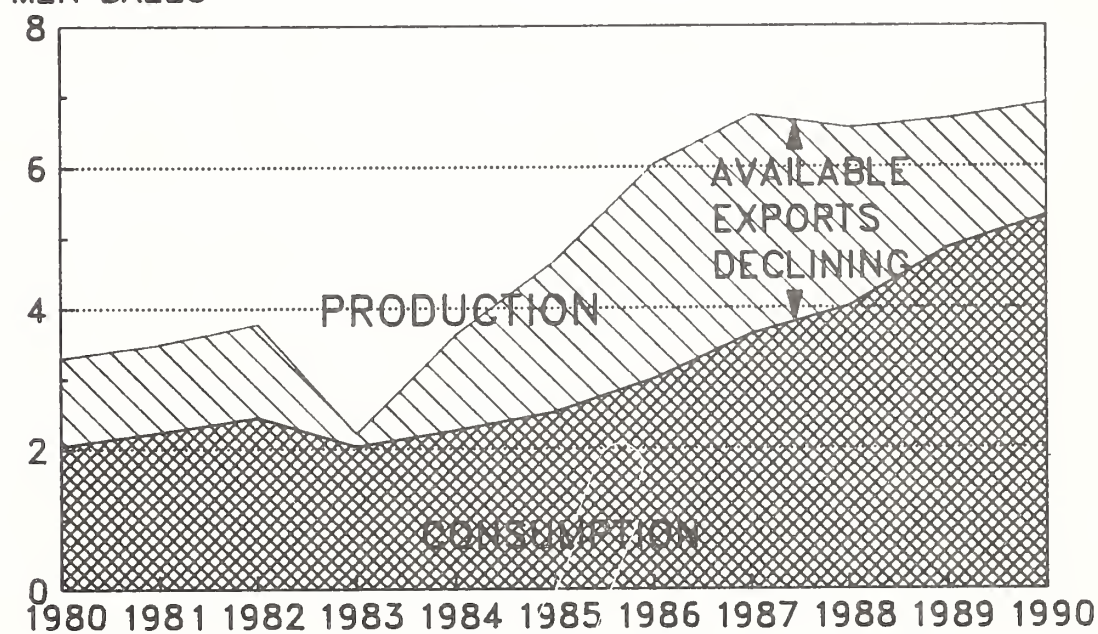
# CHINA NET EXPORTS

MLN BALES

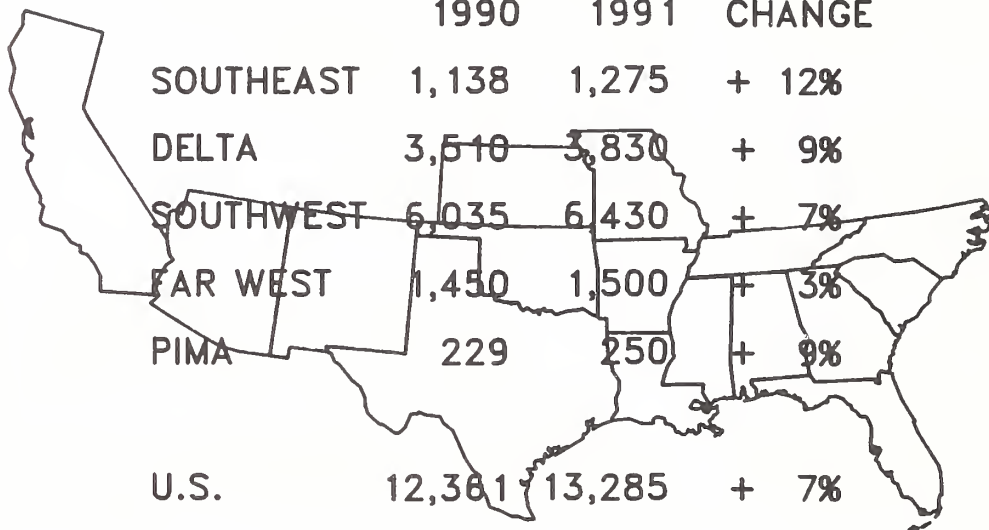


# PAKISTAN

MLN BALES

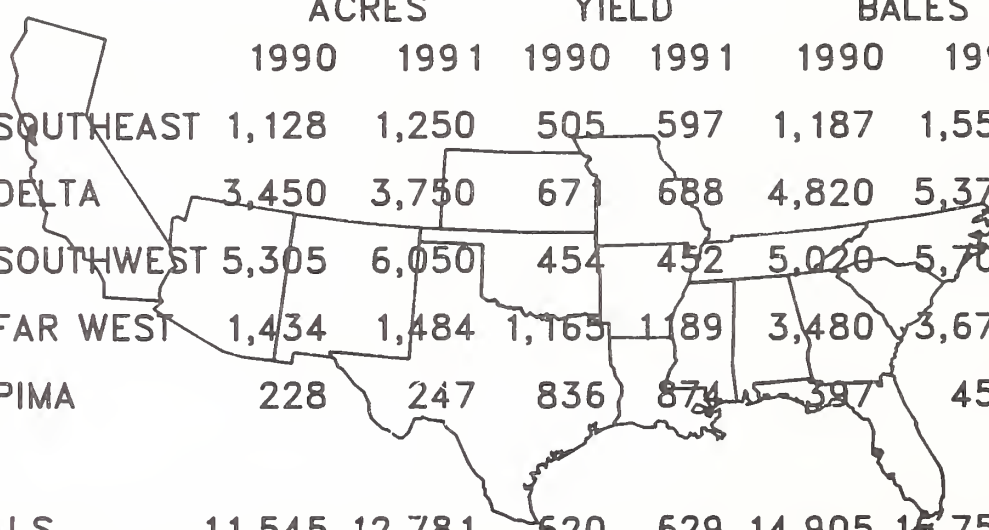


## PROSPECTIVE PLANTINGS



	1990	1991	CHANGE
SOUTHEAST	1,138	1,275	+ 12%
DELTA	3,510	3,830	+ 9%
SOUTHWEST	6,035	6,430	+ 7%
FAR WEST	1,450	1,500	+ 3%
PIMA	229	250	+ 9%
U.S.	12,361	13,285	+ 7%

## ACREAGE YIELD & PRODUCTION



	ACRES		YIELD		BALES	
	1990	1991	1990	1991	1990	1991
SOUTHEAST	1,128	1,250	505	597	1,187	1,555
DELTA	3,450	3,750	671	688	4,820	5,375
SOUTHWEST	5,305	6,050	454	452	5,020	5,700
FAR WEST	1,434	1,484	1,165	1,189	3,480	3,675
PIMA	228	247	836	874	397	450
U.S.	11,545	12,781	620	629	14,905	16,755



## FOOD, AGRICULTURE, CONSERVATION & TRADE ACT OF 1990




- \* COMPETITIVENESS
- \* FLEXIBILITY
- \* TARGET CARRYOVER

### 1991 UPLAND PROGRAM POSSIBILITIES

A.R.P.	15%	10%	5%
BALES	15.8	16.3	16.8
USE	14.3	14.5	14.7
STOCKS	4.0	4.3	4.6
STOCKS / USE	28%	30%	31%

MAJOR RESERVOIR STORAGE  
ON NOVEMBER 6



CAPACITY	* 25.018 MAF
HISTORICAL AVERAGE	* 14.936 MAF
CURRENT STORAGE	* 7.751 MAF
PERCENT OF HISTORICAL	* 52%
PERCENT OF CAPACITY	* 31%

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91, Session C6

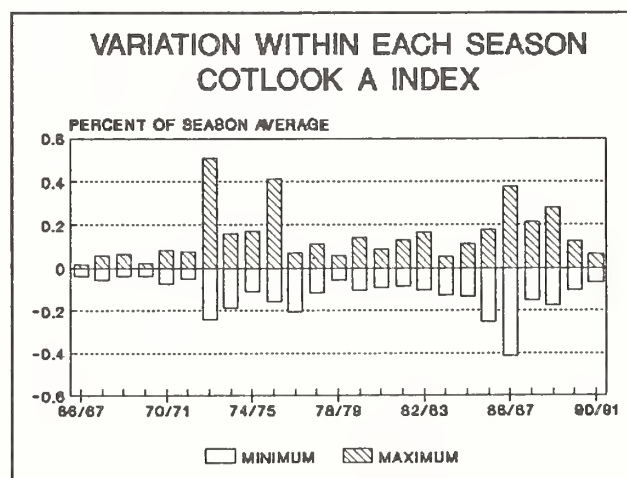
Wednesday, November 28, 1990

## COTTON PRICE STABILITY AND THE OUTLOOK FOR 1991/92

Terry P. Townsend  
Statistician, International Cotton Advisory Committee

One of the striking characteristics of the current season and the outlook for 1991/92 is the apparent stability in international cotton prices. The Cotlook A Index varied little during the first 16 weeks of 1990/91; quotes each Thursday ranged between 79.34 cents in August and 83.05 cents in November. If the current estimate of a season average Cotlook A Index of 84 cents per pound proves to be correct, the percentage difference between the highest A Index, perhaps 90 cents per pound, and the lowest quote of the season, presumably 79.34 cents, will be one of the three smallest since 1969/70.

Two reasons may account for the stability of prices so far this season: Only small changes in world ending stocks are forecast, and there is substantial agreement over the statistical fundamentals. Stability in ending stocks translates directly into smaller price fluctuations because world cotton prices need move only a few cents to a new equilibrium level this season. Even though world production is rising nearly 6 million bales, consumption is large enough to absorb the increase at prices close to the average of 1989/90.



ICAC and USDA estimates of world production made in November of each season between 1985/86 and 1989/90 differed an average of 1.0 million bales; current estimates of production differ by only .2 million bales. ICAC and USDA estimates of world cotton consumption commonly differ by .24 million bales, but there is no difference this season. Similarly, the

# WORLD COTTON SUPPLY AND USE

Years Beginning August 1  
Million 480-Lb. Bales

	1986	1987	1988	1989 Est.	1990 Proj.	1991 Proj.	1992 Proj.
<b>STOCKS, AUGUST 1</b>							
WORLD TOTAL	51.0	36.4	33.9	32.6	27.6	27.9	30.6
CHINA (MAINLAND)	17.2	9.3	6.4	4.8	3.6	3.7	4.0
UNITED STATES	9.3	5.0	5.8	7.1	3.0	2.6	3.3
TOTAL NET EXPORTERS	45.1	29.1	27.4	25.5	21.4	22.1	24.4
NET IMPORTERS	5.9	7.3	6.5	7.1	6.2	5.8	6.1
<b>PRODUCTION</b>							
WORLD TOTAL	70.2	81.3	84.4	80.1	86.5	91.1	
CHINA (MAINLAND)	16.3	19.5	19.1	17.4	19.1	20.4	
USSR	12.2	11.3	12.7	12.2	12.4	11.7	
UNITED STATES	9.7	14.8	15.4	12.2	14.9	16.7	
INDIA	7.3	7.1	8.3	10.6	10.2	10.6	
PAKISTAN	6.1	6.7	6.5	6.7	7.0	7.3	
BRAZIL	2.9	4.0	3.3	3.1	3.7	3.8	
<b>CONSUMPTION</b>							
WORLD TOTAL	84.0	83.6	85.4	86.2	86.3	88.6	
CHINA (MAINLAND)	21.0	20.0	20.5	19.6	19.2	20.3	
EASTERN EUROPE & USSR	12.6	12.3	12.4	12.1	11.3	11.0	
MAJOR EAST ASIAN <sup>1</sup>	10.6	10.4	10.9	10.6	10.4	10.8	
UNITED STATES	7.5	7.6	7.8	8.8	8.4	8.6	
INDIA	7.9	7.8	8.1	8.7	9.1	9.4	
EC	6.3	6.2	5.8	5.8	6.1	6.1	
<b>EXPORTS</b>							
WORLD TOTAL	26.6	23.4	26.2	24.2	24.0	24.7	
UNITED STATES	6.7	6.6	6.1	7.7	7.0	7.4	
USSR	3.4	3.5	3.5	3.0	2.7	3.5	
FRANCOPHONE AFRICA	1.6	1.7	2.1	2.1	2.1	2.2	
PAKISTAN	2.9	2.3	3.8	1.4	1.6	1.5	
AUSTRALIA	1.3	.8	1.3	1.4	1.5	1.4	
INDIA	1.2			1.0	1.5	1.2	
CHINA (MAINLAND)	3.2	2.5	1.7	.9	.9	.9	
<b>IMPORTS</b>							
WORLD TOTAL	25.4	23.4	26.2	25.1	24.0	24.7	
MAJOR EAST ASIAN <sup>1</sup>	11.8	10.1	11.2	10.0	10.3	11.0	
EC	6.0	5.3	5.2	5.1	5.2	5.3	
EASTERN EUROPE & USSR	3.7	3.9	3.9	3.5	2.8	2.6	
CHINA (MAINLAND)		.1	1.4	1.9	1.2	1.1	
ENDING STOCKS/USE <sup>2</sup>	.38	.40	.43	.38	.36	.39	
COTLOOK A INDEX <sup>3</sup>	62.05	72.30	66.35	82.40	84	80	

<sup>1</sup> Includes China (Taiwan), Hong Kong, Indonesia, Japan, the Republic of Korea and Thailand.

<sup>2</sup> World-less-China (Mainland) ending stocks minus China net exports, quantity divided by world-less China consumption.

<sup>3</sup> U.S. cents per pound. Forecasts for 1990/91 and 1991/92 based on net China (Mainland) trade and ratios of world-less-China (Mainland) ending stocks to use.



differences between ICAC and Cotton Outlook estimates of world production and consumption are unusually small in 1990/91. The uncharacteristic harmony over statistical fundamentals suggests greater agreement among market participants as to what prices should be, which in turn suggests fewer gyrations during a legitimate process of price discovery.

Despite the outlook for relatively stable prices this season, there is, as always, the possibility that the statistical fundamentals could change. To cite several examples, cotton mill use in the United States is estimated at 8.4 million bales but current rates of actual use are near 8.7 million bales. Furthermore, retail sales at apparel and accessory stores and at general merchandise stores have been higher in 1990 than in 1989, even during August and September, and retail inventories are lower. While monthly rates of cotton mill use may decline during the winter, the conditions for a sustained recession in the textile industry are not in place. Thus the USDA decision in the November lock-up to raise the estimate of U.S. mill use for 1990/91 was a wise one.

Retail sales in China (Mainland) are rising after more than a year of austerity, and a decision could be made to increase imports and raise mill use above current estimates. Production in the Southern Hemisphere is estimated at a record 9 million bales based on increased area and average yields, but planting is still continuing and poor weather could reduce yields.

An increase from current estimates of one million bales in world consumption, or a similar decline in production, would raise the forecast of the season average Cotlook A Index to 86 cents per pound, implying a rise in the Index to more than 90 cents by the end of the season. Conversely, the advent of a world wide economic recession could cause consumption and price expectations to fall.

Another major question in the fundamental statistics affecting the world cotton economy is the outlook for exports from the USSR. The Soviet Union has committed only 500,000 bales of cotton for shipment during 1990/91, a very low level of sales compared to previous years. Commitments reached 2.4 million bales by mid-November 1989; more than 75% had been sold to COMECON countries and Yugoslavia. Almost no sales have been made to these countries by the Soviet Union for 1990/91 because of lower consumption in Eastern Europe and internal organizational difficulties in the USSR. The uncertain situation regarding the organization of cotton exports from the USSR in 1991 is the main factor behind the projected decrease in Soviet exports from 3 million bales in 1989/90 to 2.7 million in 1990/91. There is the possibility that even after January, cotton supplies will remain bottled up in the Soviet Union, possibly having a substantial impact on market prices during

the last half of the season.

## RECORD PRODUCTION AND CONSUMPTION IN 1991/92

In 1991/92, world production is expected to exceed consumption, causing a slight increase in stocks. However, continuing strength in consumption is expected to keep prices near 80 cents a pound for the third consecutive season. Both production and consumption are expected to be record high.

Production in 1991/92 is expected to rise 5 million bales to 91 million, with 40% of the increase expected from the United States. The U.S. Government cotton program for 1991/92 has not been announced, but the broad outlines of new legislation indicate that farmers will be able to plant more area to cotton

in exchange for reduced program benefits. U.S. production could rise to 17 million bales. The percentage of area cotton farmers are required to divert to other uses under the program may fall from 12.5% to 5%, adding 900,000 acres to cotton planted area in 1991/92. An additional 750,000 acres may be drawn to cotton under the triple base provision of the new legislation.

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### ESTIMATES OF COTTON AREA AND PRODUCTION IN THE UNITED STATES

	1988	1989	1990	1991 est.
<b>Upland Cotton</b>				
Base (000 acres)	14,485	14,564	14,378	14,400
Participation rate	89%	89%	87%	88%
Acreage Reduction Program	12.5%	25.0%	12.5%	5.0%
Required Reduction	1,611	3,224	1,561	634
Participant Planting	10,378	9,041	10,325	11,406
Nonparticipant Planting	1,947	1,169	1,747	1,555
Triple Base Planting				750
Total Planted Area	12,325	10,210	12,073	13,711
<b>All Cotton</b>				
Planted Area (000 acres)	12,515	10,587	12,309	13,961
Harvested Area	11,948	9,538	11,495	12,984
Average Yield (lbs/acre)	619	614	622	620
Production (000 Bales)	15,412	12,196	14,905	16,770

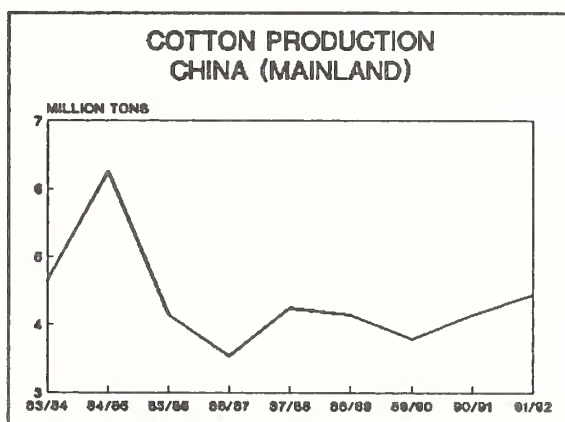
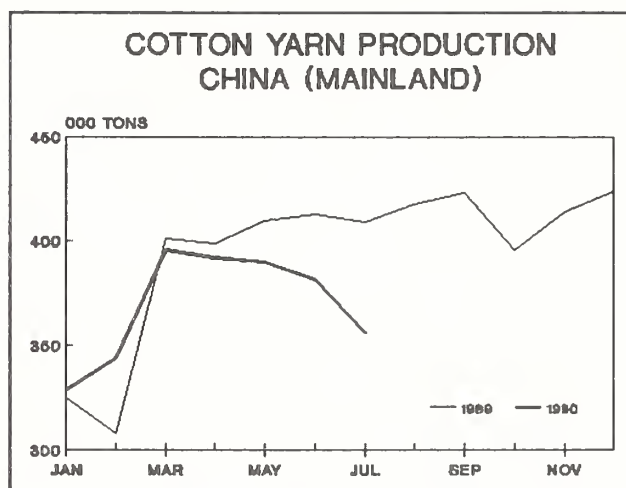
All Cotton includes Pima

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Shortages of cotton in a growing textile economy in China (Mainland) are expected to result in further improvements in incentives to produce cotton. Monthly statistics on cotton yarn production in China (Mainland) show a steep decline in production during May, June and July 1990 compared with the same months of 1989. Articles in the Chinese press suggest that shortages of cotton, rather than a weakness in internal demand, are causing the decline

in production. Based on prices quoted in Hong Kong for Chinese yarn, the value of cotton yarn not produced during July 1990 was about \$100 million, giving an estimate of the size of the incentive to the Chinese economy to increase cotton production.

Cotton area rose 6% to 5.5 million hectares in 1990 in response to a 25% rise in



national cotton procurement prices. Because of the scarcity of land, area devoted to cotton is expected to remain at the same level in 1991/92, with the possible exception of Xinjiang Province, where cotton area has been rising for several years. Using average yields in each province based on statistics from 1985/86 through 1989/90, results in a production estimate of 20 million bales in 1991/92. Production in

Shandong Province could reach 5.5 million bales.

Cotton production in the Soviet Union may decline as less area is devoted to cotton. Area in Uzbekistan (Uzbekistan accounts for more than 60% of USSR cotton production) fell 14% to 1.8 million hectares between 1987/88 and 1990/91 to relieve environmental and agronomic problems associated with a cotton monoculture. Cotton area has declined in other Republics as well, and press reports indicate that public sentiment favors continued reductions in cotton production. In 1991/92, Soviet cotton area is forecast to fall 3% and production is forecast to fall 700,000 bales to 11.7 million.

Production in India may remain above 10 million bales. Yields in India rose an average of 12 pounds per acre per year during the 1980's, and production reached a record 10.6 million bales during 1989/90. 1990/91 will be the second year of production above 10 million bales. One of the factors causing the increase in production is increased use of hybrid seeds; use of high yielding hybrids rose from 16% of planted area in 1988/89 to 29% in 1989/90. Most of the increase in use of hybrids came in the central and southern zones, where yields are traditionally the lowest.

Rising returns to cotton production may be encouraging the adoption of new technology, including the use of hybrid seeds. Between 1981/82 and 1989/90, Indian cotton prices, deflated by a price index for all commodities, fell 19%, but average yields rose 61%, resulting in a real gain in income per hectare of more than 30%. With the improvement in Indian yields linked to concrete improvements in agronomic practices, rather than just to good weather, production is likely to remain above 10 million bales in 1991/92 rather than falling back to the previous average of 8 million bales.

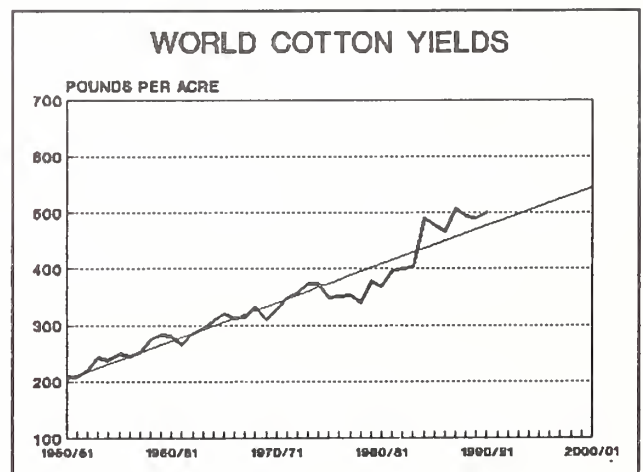
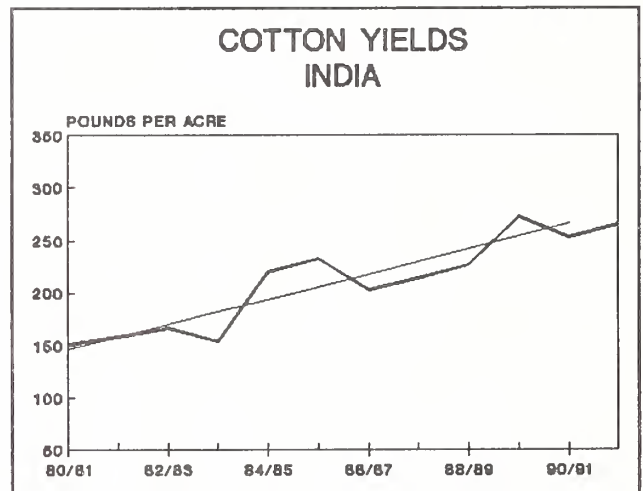
## WORLD COTTON YIELDS RISING

The world average yield in 1990/91 will reach 500 pounds per acre for only the second time, continuing a decades-long trend of rising productivity. Between 1950/51 and 1989/90, world average cotton yields rose from 208 pounds per acre to 490, with a record of 508 pounds established in 1987/88. The average increase per year over the last 38 years was 7 pounds per acre, although yields fell in the middle 1970's and rose sharply after 1978. The average increase per year during the 1980's was 15 pounds per acre. An extrapolation of the average increase between 1950/51 and 1989/90 results in a value of 545 pounds per acre by 2000/01. Such a yield from the same amount of land devoted to cotton as in 1990/91 would result in production of just 94 million bales. Given that consumption of cotton is likely to be higher, it follows that either world cotton area will need to expand or that the yield increases of the 1980's will have to be repeated during the 1990's.

## RATIOS OF COTTON AND COMPETING CROP PRICES

Crop Year	Cotton/ Wheat	Cotton/ Corn	Cotton/ Soybeans
1988	15.2	22.3	7.6
1989	17.6	27.8	11.5
1990	25.6	28.3	11.6

Season average farm prices in the United States. Cotton, cents per pound; grain and soybeans, dollars per bushel.





## COTTON CONSUMPTION TIED TO INCOME GAINS

By the start of 1991/92, mill use of cotton will have been stable for two seasons while consumption at the retail level worldwide will probably have risen. Consequently, stronger economic growth and increased supplies of cotton are expected to lead to increased use of cotton during 1991/92. Prospects for increased mill use are the strongest in Pakistan, India, Indonesia, Thailand, Japan, China (Mainland), Germany, Brazil and the United States.

### World Economic Outlook

The world economic outlook has not changed since late September. World GNP is expected to grow in 1990 above 2%, a growth rate considered sufficient to maintain current levels of world textile consumption. Disparities among countries, however, are becoming more evident.

In the United States, despite the latest statistics showing higher than expected third quarter GNP growth of 1.8%, it is expected that very low growth or perhaps a recession will take place in the fourth quarter of 1990 and first quarter of 1991. While growth in the third quarter was fueled by exports, the economy as a whole is showing increasing weakness. Nonfarm employment declined in October by 68,000 jobs. Declines occurred in all sectors including services, a sector thought to be the strongest in the U.S. economy. Along with employment statistics, lower orders for consumer goods and a sharp drop in real estate sales and construction spending suggest a decline in the economy. However, if a recession occurs, it is expected to be very mild. U.S. business inventories are not at high levels and interest rates are being maintained at relatively low levels.

With lower growth in the U.S. economy, it is expected that some countries will not be able to grow at previously estimated levels, particularly developing countries whose main export market is the United States. However, the U.S. economy is having less of an impact upon the rest of the world than it would have had in the early 1980's because the economies of other industrial countries have gained strength through their domestic markets. In Europe, investments and government expenditures have been boosted by the reunification of Germany and restructuring of Eastern Europe, as well as by the efforts of businesses to prepare for the new economic environment in a unified European market in 1992. In Japan, domestic demand is being fueled by increases in fixed investment, which will secure continued high productivity and output levels.

Current estimates of world growth take into account increases in oil prices caused by the events in the Persian Gulf since early August. It has been estimated by the International Monetary Fund (IMF) that a 40% rise in the world price of oil sustained over the next two years would cause a drop of the GNP growth rate of industrial countries of 0.2 percentage points in 1990 and 0.5 in 1991. However, the effects on each country depend on the degree of adjustment capabilities of the economy. The higher cost in dollars of oil imports has been offset in countries like Japan and Germany where currencies have risen against the dollar since August. In fact, the Bank of Japan estimates that a 1-yen appreciation in the exchange rate against the dollar offsets the impact of a 1-dollar rise in oil prices. From August 1 to November 12 the yen rose 13% to 128 yen per dollar. Similarly the German mark rose 7.4% to 1.478 marks per dollar.

The effects of higher oil prices on developing countries would put an extra burden on countries that are predominantly exporters of primary products and manufactured goods to industrial countries, while it will benefit oil exporting countries. Sixty-eight percent of world GNP is located in industrial countries, 22% in developing countries and 10% in Eastern Europe and the USSR.

It has also been estimated by the IMF that the process of German reunification will add 0.1 percentage points to real GNP in industrial countries in 1990 and 0.3 in 1991.

The central conclusion to be drawn from the various economic forecasts is that the world economy continues to grow and that growth will accelerate during 1991, perhaps returning to 3% by 1992. Economic growth will lead to increases in consumption of textile fibers, and cotton continues to maintain its share of world fiber consumption. In summary, constrained supplies, rather than burgeoning surpluses caused by recession, characterize the world cotton economy in 1990/91, and further increases in consumption are likely during the next several seasons.

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The International Cotton Advisory Committee is an association of 44 governments of cotton producing and consuming countries. The Secretariat of the Committee, with offices in Washington, D.C., collects statistics and other information related to world cotton production, trade, consumption, stocks and prices. The Committee provides a forum for international consultation and discussion on matters related to cotton. The Committee has consultative status with the U.N. and its specialized agencies and cooperates closely with other international organizations.

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# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## CLOTHING EXPENDITURES OF SINGLE-PARENT HOUSEHOLDS

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### Introduction

In 1988 there were 31.9 million families in the U.S. with own children under 18 years old. Most of these families, 77 percent, were headed by a married couple; 20 percent had a female householder, no spouse present, and 3 percent were headed by a male householder, no spouse present (5). The national trend, however, is for an increase in single-parent families; since 1980, this segment of the population has grown by 3 percent, from 20 percent of all families with children under 18 in 1980 to 23 percent in 1988 (6).

As nontraditional family structures become more prevalent, expenditure studies should include these families (2) so that spending patterns and socioeconomic and demographic characteristics of single-parent families can be identified. Research comparing the expenditure patterns of single-parent and married-parent households is limited (1).

Lino (3) compared total expenditures, together with housing, transportation, and food expenditures over a 25-year period, for husband-wife and single-parent families. A major finding was that real after-tax income for single-parent families decreased by 18 percent, and real expenditures by 9 percent, between 1960-61 and 1986. In contrast, both real income and real expenditures for husband-wife-children families increased. Boyle (1) examined selected household and per capita average expenditures of single-

parent and married-parent consumer units and determined that many of the differences in expenditures between these two types of families could be explained by differences in home ownership and car ownership. Per capita expenditures on apparel for boys, girls, and women were higher in single-parent than in married-couple families.

DeWeese (2) compared clothing expenditures in two-parent and single-parent households using data from the 1984 Consumer Expenditure Survey. Female-headed households spent more on women's clothing than did two-parent households. Also, with an increase in total expenditures, a larger proportion of that increase was allocated for clothing expenditures in female-headed households than in married-couple households.

Lino (4) studied clothing (and other) expenditures of single-parent families. He calculated that for every 1.00 percent increase in after-tax income, holding all else constant, clothing expenditures in single-parent families increased by 0.36 percent. Also, single-parent households with an employed head spent 63 percent more on clothing than those with an unemployed head. When two- and three-person, single-parent families were compared, however, family size had little effect on clothing expenditures.

The purpose of this study is to determine whether single-mother families differ from two-parent families (with oldest child younger than 16 years) in clothing expenditures and to examine other family characteristics that may impact on spending for apparel.

#### Source of Data

Data for this study are from the 1987 Consumer Expenditure Survey (CEX). Conducted by the Bureau of Labor Statistics (BLS), U.S. Department of Labor, the CEX is an ongoing survey that collects information on consumer unit characteristics and income as well as expenditures. A rotating sample of about 5,000 consumer units was interviewed each quarter in 1987 yielding 19,596 quarterly responses. For this analysis consumer units with (1) a husband, wife, and an oldest child under 16 years or those with (2) a single female parent and an oldest child under 16 were selected. All of the families consisted of parents and own children only, i.e., no other persons (related or nonrelated) lived in the household. Also, all families met the BLS criteria for being considered a complete income reporter. There were 3,607 families headed by a husband and wife and 749 families headed by a single female.<sup>1</sup> This sample was weighted to reflect the U.S. population of 14.5 million husband-wife families and 3.3 million single-mother families with an oldest child under 16 years.

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<sup>1</sup>Very few single-father households were sampled in the CEX. It was assumed that single-mother and single-father families are not homogeneous in apparel spending behavior. Thus, single-father households were omitted from the analysis.



Income data are annual income figures reported by households. Expenditure data are quarterly figures, multiplied by four to provide estimates of annual expenditures.

Certain terms, such as apparel and clothing, are used interchangeably throughout this report. Single-parent is equivalent to single-mother. Reference person, household head, or householder each refer to the head of the household. Household and family are each used to indicate the consumer unit.

#### Variables

Apparel expenditure categories include total apparel, women's, men's, children's, and other apparel commodities and services (see box below). Household characteristics are age, education, and race of reference person, before-tax income, housing tenure, family size, family composition, region, and number of earners in the family.

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#### Definitions

**Total Apparel** - All types of clothing or clothing accessories worn by men, women, and children; and other apparel commodities and services.

**Women's** - includes coats and jackets, dresses, sport coats and tailored jackets, vests and sweaters, shirts and blouses, skirts and culottes, pants, shorts, active sportswear, nightwear, undergarments, hosiery, suits, accessories, uniforms, and other clothing *and* footwear.

**Men's** - includes suits, sport coats, coats and jackets, underwear, hosiery, nightwear, accessories, sweaters and vests, active sportswear, shirts, pants, shorts, uniforms, and other clothing *and* footwear.

**Children's** - includes apparel items for boys and girls, ages 2-15, and infants and toddlers less than 2 years old: coats and jackets, sport coats, suits, sweaters, shirts, dresses, blouses, skirts, pants, shorts, active sportswear, underwear, diapers, nightwear, hosiery, accessories, uniforms, and other clothing *and* footwear.

**Other apparel commodities and services** - includes material for making clothes, sewing notions, patterns, watches, jewelry, shoe repair, apparel laundry and dry cleaning (coin-operated and not coin-operated), clothing repair and alteration, clothing rental, watch and jewelry repair, and clothing storage.

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## Characteristics of Households

Characteristics of households headed by single mothers compared with those headed by married couples are shown in table 1. Mean family size suggests the presence of two children, on average, in both types of families.

On average, single-parent households had lower incomes than did married-couple households. Households headed by a single woman were much more likely to report annual income below \$20,000 (86 percent) than were households with two parents (22 percent).

The percent of single-parent households with the mother employed (64 percent) was very similar to that of married-couple households with both husband and wife employed (68 percent). This indicates that about one-third of mothers of children under age 16 are not employed in the labor force.

Single-parent families were much less likely to own their home (25 percent) than were married-couple families (71 percent). Most families in the sample lived in urban areas. Single-parent families were less likely to live in rural areas<sup>2</sup> than were families headed by a husband and wife.

The reference person (the mother) in single-parent households was, on average, younger than the reference person (usually the father) in married-couple households. Whereas 42 percent of single mothers were less than age 30, only 24 percent of reference persons in households with a husband and wife were under 30.

Compared with the reference person in married-couple households, single mothers were less likely to have any college education (52 and 30 percent, respectively). Also, they were twice as likely to be without a high school diploma (30 percent compared with 15 percent).

Single mothers were less likely to be white than reference persons in married-couple households. Almost two-thirds of single-mother families were white, whereas 90 percent of two-parent families had a white household head.

## Household Expenditures

Families with children less than 16 years old spent almost \$1,400 for apparel and apparel services (table 2). Those headed by a husband and wife spent approximately \$750 more than families headed by a single mother. As a percentage of total expenditures, however, husband and wife families spent a slightly smaller share for clothing, footwear, and services than did single parent families, 5 percent compared with 6 percent.

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<sup>2</sup>Rural areas in the CEX have populations<sup>a</sup> less than 2,500. Identification of these areas by region of the country is not available.

In both types of families, more was spent on children's apparel than on men's or women's or other apparel commodities and services. A lower amount was spent on men's clothing than on women's.<sup>3</sup>

Family expenditures for apparel were compared by age of the oldest child. Highest expenditures were reported by families with older children (oldest child between 11 and 15), and lowest, by families with younger children (oldest child under 6). This trend was observed in families headed by a husband and wife and in those headed by a single mother.

In both types of families, expenditures for children's clothing increased with the age of the oldest child. For families headed by a single mother, apparel expenditures for women increased with the age of the oldest child. In married-couple families, however, apparel expenditures for women decreased as age of the oldest child increased.

### Per Capita Expenditures

Because clothing is usually purchased for an individual, it is useful to examine the findings on a per capita basis, or in the case of children's clothing, expenditures per child. Mean number of children under 16 in both two-parent and one-parent families was 1.92 (table 3). As expected, mean number of children in families rose with the age of oldest child, from 1.45 to 2.24 in those headed by married couples and from 1.58 to 2.06 in those headed by single parents.

Per capita total expenditures for families with children under 16 were \$6,884 in 1989. In married-couple families, per capita expenditures were higher, \$7,312, than in families headed by single mothers, \$4,392. Per capita expenditures for apparel and apparel services averaged \$373 for all families, \$391 for married-couple families, and \$274 for single-parent families. Families headed by a husband and wife spent, on average, almost \$100 more per child for children's clothing than did families headed by a single mother. Expenditure differences between types of families were greatest among those with an oldest child less than 6 years of age.

When levels of total expenditures were compared among families with children of different ages, total expenditures on a per capita basis decreased in married-couple families as the age of the oldest child increased. In single-parent families, however, per capita total expenditures increased with the age of the oldest child. A similar pattern was observed for per capita apparel expenditures and children's apparel in families headed by single mothers.

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<sup>3</sup>Men's clothing expenditures in single-mother households likely were gifts since there were no males in the consumer unit 16 or older, and clothing purchased for boys 15 or younger was coded as boy's clothing.

## Multivariate Analysis

In order to assess the effects of family type, i.e., single mother or married couple families, on clothing expenditures when other socioeconomic and demographic factors were controlled, multivariate analyses were conducted. The percent of families with no expenditures<sup>4</sup> was only 4 percent for total apparel, but 13 percent for children's clothing, 26 percent for women's clothing, 47 percent for men's clothing and 32 percent for other apparel, so tobit analysis was used. When a substantial proportion of families exhibit zero expenditures, tobit analysis yields more efficient estimates than ordinary least squares analysis.

When other socioeconomic and demographic factors were controlled, there was no difference between the two family types in their expenditures on any clothing category except for men's (table 4). As expected, single-mother families spent significantly less than two-parent families on men's clothing.

Income and education were positively related to all categories of apparel spending. In addition, family size affected expenditures for clothing; as family size increased, expenditures on children's clothing increased, but those for women's and men's apparel decreased.

The age of the oldest child was a significant factor for total apparel expenditures and expenditures on children's clothing. Families with older children spent more on children's clothing, perhaps because clothing items for older children may cost more.

Homeowners spent more than renters on each category of apparel. This may be a proxy for assets; that is, families with more assets spent more on apparel. Urban families spent more than rural families on total clothing. For other clothing categories, spending was significantly higher in one or two urban regions, as compared with rural areas. These differences indicate that regional differences may exist in the clothing expenditure patterns of families with the predominant difference being lower expenditures by rural families.

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<sup>4</sup>These were quarterly data, so the percentages of families who did not purchase clothing were higher than would be found using annual data. Annual data from this survey can be obtained by combining four quarters of data for households that were in the study all four quarters during the year. However, this procedure greatly reduces the sample size because households that were in the survey fewer than four quarters (due to the rotating design of the survey or attrition) would not be used. The sample no longer would be representative and could not be weighted to provide estimates of U.S. expenditures. Thus, this study used quarterly data with expenditures multiplied by four to provide estimates of annual expenditures.



Differences in clothing expenditures among races were not pronounced. Blacks spent more than whites for total apparel and other apparel and services. Other races, Asians and Indians, spent less than whites for men's clothing and more for other apparel and services.

A dummy variable for the interview quarter was included in the tobit analyses to control for possible effects. Interview quarter was significant in each clothing category, perhaps reflecting price increases over the year, school purchases in quarter three, and Christmas purchases in quarter four.<sup>5</sup>

In summary, the tobit results show that family type was not a factor in overall apparel or children's clothing expenditures. The substantial differences between two-parent and single-mother expenditures shown in table 2 may reflect various characteristics such as income and education associated with the family type. Income was a significant predictor of all clothing expenditures; 86 percent of single-parent families have incomes under \$20,000 compared with 22 percent of two-parent families. Education was related positively to clothing spending; 52 percent of two-parent families have a college education compared with 30 percent of single-mother families.

### Implications

Educators and family financial counselors may wish to target single-parent families as primary audiences for financial programs that include information on clothing purchases. There is no evidence from this study or from DeWeese's study that single-mother families and two-parent families spend differently on apparel when other factors are held constant. However, on average, they have less money to spend. Lower income families of all types may benefit from educational programs on maximizing the use of clothing dollars.

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<sup>5</sup>The interview quarter does not coincide with a season since five different months of data may be covered in any one quarter. For example, quarter four included households that were interviewed in January, February, or March of 1988. They were asked for expenditures in the three months prior to the interview, which would, in this example, include expenditures for October, November, December, January, and February.

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**Table 1. Characteristics of married-couple and single-mother families, oldest child less than 16 years, 1987**

Characteristic	Married-couple families	Single-mother families
Average family size (number) . . . . .	3.93	2.86
	<u>Percent</u>	
Income:		
Under \$20,000 . . . . .	22	86
\$20,000 - \$40,000 . . . . .	43	12
Over \$40,000 . . . . .	35	2
Earners:		
One . . . . .	30	64
Two . . . . .	68	*
Homeowner . . . . .	71	25
Residence:		
Urban		
Northeast . . . . .	16	18
North Central . . . . .	19	25
South . . . . .	28	31
West . . . . .	19	16
Rural . . . . .	18	10
Age of reference person (years):		
Under 30 . . . . .	24	42
30 - 40 . . . . .	56	45
Over 40 . . . . .	20	13
Education of reference person:		
Some high school . . . . .	15	30
High school graduate . . . . .	33	40
Some college . . . . .	27	22
College graduate or more . . . . .	25	8
Race of reference person, white . . . . .	90	65

\*Not applicable.

**Table 2. Apparel expenditures of married-couple and single-mother families, oldest child less than 16 years, 1987**

Household characteristic	Percent of families	Mean expenditures					
		Total	Total apparel and services	Children's	Women's	Men's	Other apparel commodities and services
All households, oldest child <16 . . . . .	100.0	\$25,746	\$1,396	\$543	\$387	\$231	\$235
Family composition:							
Married couple, child <16 . . . . .	81.5	28,735	1,536	579	418	281	258
Married couple, child <6 . . . . .	28.6	27,593	1,461	457	455	298	251
Married couple, child 6 - 10 . . . . .	25.3	29,630	1,517	546	407	270	294
Married couple, child 11 - 15 . . . . .	27.6	29,097	1,628	734	389	273	232
Single mother, child <16 . . . . .	18.5	12,561	785	385	252	13	136
Single mother, child <6 . . . . .	4.3	10,531	637	263	230	12	132
Single mother, child 6 - 10 . . . . .	6.9	12,015	758	357	250	8	143
Single mother, child 11 - 15 . . . . .	7.3	14,275	898	483	266	18	131

**Table 3. Per capita apparel expenditures of married-couple and single mother families, oldest child less than 16 years, 1987**

Household characteristic	Average number of children	Per capita expenditures		
		Total	Total apparel and services	Children's
All households, oldest child < 16 . . . . .	1.92	\$6,884	\$373	\$283
Family composition:				
Married couple, child < 16 . . . . .	1.93	7,312	391	300
Married couple, child < 6 . . . . .	1.45	7,998	423	315
Married couple, child, 6 - 10 . . . . .	2.14	7,157	366	255
Married couple, child 11 - 15 . . . . .	2.24	6,862	384	328
Single mother, child < 16 . . . . .	1.86	4,392	274	207
Single mother, child < 6 . . . . .	1.58	4,082	247	166
Single mother, child 6 - 10 . . . . .	1.84	4,231	267	194
Single mother, child 11 - 15 . . . . .	2.06	4,665	293	234

**Table 4. Tobit results of apparel expenditure equations**

Household characteristic	Total apparel and services	Children's	Women's	Men's	Other apparel commodities and services
Family type (married couple, child):					
Single mother, child . . . . .				---	
Income . . . . .	+++	+++	+++	+++	+++
Education of reference person . . . . .	+++	++	+++	+++	++
Family size . . . . .		+++	---	--	
Age of oldest child . . . . .	++	+++			
Housing tenure (rent):					
Own . . . . .		++	+++	++	---
Residence(rural):					
Urban South . . . . .	+++				+++
Urban West . . . . .	+			+	
Urban Northeast . . . . .	+	+			
Urban Midwest . . . . .	++	+++		+	
Race (white)					
Black . . . . .	+				++
Other . . . . .				-	+++
Quarter of interview (quarter 1):					
Quarter 2 . . . . .	+	+++		+	
Quarter 3 . . . . .	+++	+++		+	
Quarter 4 . . . . .	+++	+++	+++	+++	+++

+++ or    ++ or    + or  
 ---, p < .001    --, p < .01    -, p < .05.



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## INCOME AND EXPENDITURES OF TWO-PARENT FAMILIES WHEN ONE PARENT IS NOT EMPLOYED

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### Introduction

With an increasing number of two-income families in the United States, social expectations to achieve and maintain a higher standard of living continue to rise. The threat of lost income as a result of nonemployment has been, and will be of concern to families, legislators, researchers, educators, and family service professionals. Family resource management professionals need to be aware of how, and to what extent, a nonemployed parent affects family financial status.

This article focuses on two-parent families with one parent who was not employed in the previous year, and examines how 1987 family income and expenditures were affected. Three different family scenarios are described and analyzed. Scenario 1 provides demographic, income, and expenditure information on families with employed mothers and fathers who were unable to work because they were ill, disabled, unable to work, unable to find work, or doing something else. Scenario 2 includes traditional families, that is, those with employed fathers and mothers who stayed at home to care for the family. The third group, dual-earner families, is examined for purpose of comparison, since they represent the employment status of a majority of two-parent families in the United States today.<sup>1</sup>

Initially, a sample of all two-parent families with children<sup>2</sup> was identified from the 1987 Consumer Expenditure Survey (CEX) and segmented into six family profiles, based on parental earner status and reason for not working. Three

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<sup>1</sup>See section on Approach for details of scenario identification and selection.

<sup>2</sup>Children were defined as parents' sons or daughters related by blood, marriage, or another legal arrangement such as foster children (14).

groups, however,<sup>3</sup> did not have an adequate sample size for meaningful analysis and subsequently were dropped from the study.

This article addresses two major research questions: (1) What are family income and expenditure patterns when one parent is not employed?; (2) Do families with fathers who are unable to work, traditional families, and two-earner families differ significantly relative to demographic, income, and expenditure patterns? If so, what are the most important demographic, income, and expenditure variables accounting for these differences?

### Approach

Data used in this study are from the interview component of the 1987 Consumer Expenditure Survey (CEX). Detailed information about household expenditures, income, and demographic characteristics have been collected quarterly since 1980 by the Bureau of Census for the Bureau of Labor Statistics. A national probability sample of 5,000 households, representative of the noninstitutional United States, is interviewed once per quarter for five consecutive quarters. It is a rotating sample with about one-fifth of the households replaced each quarter. The 1987 survey yielded a response rate of about 86 percent, with approximately 21,000 consumer units. To obtain annual family expenditure estimates, three months of household expenditure data were annualized by multiplying by four.

The final sample of two-parent families used in this study was comprised of 5,474 consumer units; all were complete income reporters. Weighted sample estimates were slightly lower than Census, due to the sampling constraints used in this study (10,13). The final sample excluded the three family groups with insufficient sample size, parents (one or both) who were retired or students, or not living together. Retired or student parents were deleted from analysis to eliminate potential distortion in family financial status due to the special financial considerations of retirement and student living.

Parents who were married but not living together on a regular basis were eliminated because of the unusual financial considerations associated with maintaining more than one household.

A two part analysis was conducted to examine family income and expenditure patterns when one parent is not employed. First, a descriptive analysis of family demographic, income, and expenditure information was completed for the three family types. Second, multivariate descriptive discriminant analysis was conducted to determine whether family types are statistically

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<sup>3</sup>The three nonusable family profiles included: (1) employed fathers with mothers who were not working due to illness, disability, or inability to find work (n=57 unweighted and 224,870 weighted); (2) employed mothers with fathers who stayed at home to care for the family (n=33 unweighted and 142,942 weighted); and (3) both parents not working (n=78 unweighted and 314,714 weighted).

different from each other, and which variables best explain the group differences among family types.

Data used in the descriptive analysis were weighted to reflect the U.S. population of two-parent families in 1987 -- approximately 21.8 million households. Generalizations to the population, however, are limited to the sampling constraints defined in this study and enumerated above.

Three separate discriminant analyses were performed on unweighted demographic, income, and expenditure data sets. The trichotomous groups or group variable in each of the three analyses were families with: (1) an employed mother and an ill or disabled father, or father who was unable to find work, (2) an employed father with a mother at home caring for the family, and (3) both parents employed.

The first discriminant analysis investigated whether 14 demographic variables could discriminate among the 3 groups. Variables used in analysis were family size, number of children under 18, fathers' age, mothers' age, fathers' education level (high school graduate/nongraduate), mothers' education level (coded as for fathers'), fathers' race (white/other), mothers' race (coded as for fathers'), children's full-time employment status (employed/not employed), children's part-time employment status (coded as for full time), housing status (own/rent), residence (urban/rural), total family before-tax income, and total annual expenditures. Ten sources of family income (see table 2) were examined in a second discriminant analysis. A third discriminant analysis was conducted on thirteen expenditure variables (see table 2) to determine whether expenditure patterns differ statistically among family types.

#### Demographic Profile of Two-Parent Families with Children

*Scenario 1: One-Earner Families. Mother Employed - Father Ill, Disabled, Unable to Work, or Unable to Find Work.* Of all two-parent families with children, 2.0 percent included a father who was unable to work. Approximately 81 percent of these fathers were ill, disabled, or otherwise unable to work; 18 percent were unable to find work; and 1 percent decided to do something else. A majority of nonemployed fathers were middle-aged or older, white, and had not graduated from high school (table 1). Mothers in these families were slightly younger, more educated, and worked in white-collar occupations. Most nonemployed-father families were homeowners living in urban areas. Family size was 3.8 persons on average, with older children, half of whom were employed either full or part time.

Compared with dual-earner families, parents in nonemployed-father families were more likely to be middle-aged or older (over age 45), minorities, not as highly educated, blue-collar or service workers, renters, and rural residents. Their children also tended to be older, that is, over age 18 and working.

Average before-tax income in nonworking-father families was \$19,996 (table 2), 52 percent lower than that of dual-earner families. This relationship held when per capita income was examined. Average annual expenditures were

\$20,084, 39 percent lower than those of two-income families (table 2). Because annual family expenditures were slightly higher than after-tax income, this group did not appear to have savings. When families were classified on the basis of 1987 U.S. poverty threshold criteria (11), 32 percent or approximately 1 in 3 families were poor or near poor. Poor was defined as families with annual money income at or below the official Government poverty threshold; near poor was defined as families with annual money income from 100 to 125 percent of the poverty threshold.

*Scenario 2: One-Earner Families. Father Employed - Mother Caring for Family.* About 25.7 percent of all two-parent families in this study were "traditional" families (father employed, mother homemaker). A majority of fathers in this group were young, white, high school or college graduates, and worked in white-collar occupations (table 1). Mothers fit a similar profile but were slightly less educated. Most traditional families owned their own home, lived in urban areas, and had young children.

Compared with dual-earner families, traditional families were slightly larger (4.2 family members compared with 3.9). Mothers who chose to be homemakers were about the same age as mothers in dual-earner families, but were less likely to have graduated from college. Compared with dual-earner families, traditional families were more likely to rent and live in urban areas. Children in traditional families were less likely to be employed than children in dual-earner families, possibly a function of family life cycle stage.

Traditional families' before-tax income was \$34,746, about 16 percent lower than that of dual-earner families (table 2). This income gap was even greater when per capita income was examined. However, since after-tax income in traditional families was greater than their average annual expenditures, this group appeared to have some savings. About 17 percent or 1 in 6 families lived at or near the poverty level.

#### Family Income

When a father was unable to work due to illness, disability, or inability to find work, families used savings or government support to supplement the employed parents' wage and salary income. Government support benefits may include unemployment insurance, workers' compensation, Veterans benefits, Social Security or Railroad Retirement,<sup>4</sup> welfare, Aid to Families with Dependent Children (AFDC), Supplemental Security Income (SSI), or food stamps. In contrast, when a mother chose not to work, families supplemented the fathers' wage and salary income with asset earnings such as interest, dividends, rental and other property income. When both parents were employed, almost all family income was derived from earnings (table 2).

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<sup>4</sup>Social Security (OASDHI - Old Age, Survivors, Disability, and Health Insurance) and Railroad Retirement provide income to unemployed workers and their dependents in event a worker is disabled (12).



*Nonworking Fathers.* Before-tax income of families with a father who was not working was less than one-half that of families in which both parents worked (\$19,996 compared with \$41,477), even though the average household size for each family type was approximately four persons (tables 1 and 2). Compared with dual-earner families, nonworking-father families had young adult children (48 percent compared with 23 percent) who were more likely to work (55 percent compared with 33 percent). Although dual-earner parents received 97 percent of family income from earnings, families with a father who was unable to work received only 61 percent of income from earnings, with Social Security and public assistance benefits contributing 18 percent and 14 percent, respectively.

*Nonworking Mothers.* Families of mothers who chose to be homemakers reported 16 percent less before-tax family income than dual-earner parent families (\$34,746 compared with \$41,477) (table 2). Average household size for both family types was approximately four persons with two children under age 18. Only about one-quarter of traditional families had a child working in paid employment outside the home, compared with almost one-third of dual-earner families. Both traditional and dual-earner families received over 90 percent of income from earnings.

*One-earner Compared with Dual-earner Families.* Data show, and previous research indicates, that one-earner, two-parent family income is lower, on average, than dual-earner family income (1). Knowing why a parent is not employed may indicate whether or not, and the extent to which, the family is financially vulnerable (6,9). Per capita income in families with a sick or disabled father, or a father who was unable to find employment, was about half that of dual-earner families. In contrast, when a mother chose to stay home to care for a family, per capita income was approximately three-quarters that of dual-earner families.

### Family Expenditures

Understanding why a parent is not employed may also provide insight into differences in family spending patterns. As would be expected, families with a nonemployed parent tend to spend less than dual-earner families. When one parent is not employed, families may omit luxury and discretionary purchases from their budget or substitute less expensive goods or services. Budget share and dollar differences reflect, in part, differences in income, personal preferences, family composition, regional price differences, and expenditures for certain fixed and contractual obligations such as housing (home mortgages), transportation (auto loan payments), and other fixed credit obligations.

*Nonworking Fathers.* Table 2 shows the proportion of family income allocated for key expenditures when a father was not working. As predicted, absolute expenditures were lower for families with nonworking fathers than for those in which both parents worked (\$20,084 vs. \$33,068). When a father was not working, families spent about 103 percent of after-tax income on household goods and services, compared with only 88 percent by dual-earner parent families. Families with a nonworking father spent proportionately the same as

dual-earner families on housing (29 percent) but proportionately more on transportation (25 percent vs. 22 percent), food at home (16 percent vs. 11 percent), and health care (5 percent vs. 4 percent). Budget shares for clothing and personal insurance were about the same for both groups. As expected, shares for entertainment and pensions were lower in families with a nonworking father. Nonworking-father families spent only about one-third the amount spent by dual-earner parents for pensions and Social Security. This may be because nonworking fathers no longer contribute to employment-related retirement programs. Expenditures such as alcohol and personal care were similar for both groups. However, families of nonworking fathers spent much more on tobacco than did families with two working parents.

*Nonworking Mothers.* Families with mothers who chose to stay at home to care for a family were able to keep expenditures below annual after-tax income. They spent about 91 percent of after-tax income, almost 4 percent more than dual-earner parents. Expenditure shares of families with nonemployed mothers were similar to those of families with two-parent earners. Budget shares for housing, food at home, and clothing were slightly greater in families with mothers who chose to be homemakers than in families with both parents working. Budget shares for transportation, pensions, and Social Security were slightly lower in nonworking-mother families than in dual-earner families.

*One-earner Compared with Dual-earner Families.* In general, traditional family spending patterns resembled those of dual-earner families, whereas the spending patterns of nonworking-father families were different. A look at actual dollar amounts showed that nonemployed-father families spent half as much as traditional families on food away from home, clothing, personal insurance, entertainment, alcoholic beverages, and other miscellaneous items. Contrary to expectations, dollar expenditures for health and personal care were about the same for both one-earner and two-earner groups. The two different groups of nonemployed parent families exhibited greatest share variation for transportation (6 percentage points), pensions (4 percentage points), and food at home (3 percentage points). Shares in other expenditure categories were fairly stable between groups.

#### Discriminant Analysis of Family Types

Multivariate discriminant analysis was used to determine: (1) if family types differed significantly relative to examined demographic, income, and expenditure variables, and (2) if resultant differences could be described in terms of higher inference variable profiles. Discriminant analysis is particularly well suited for data analysis when explanation of group differences in terms of multiple variables is desired (2,5,7,8).

Discriminant analysis results are presented in table 3. To test whether a variable set could be used to significantly discriminate among family types, the Wilkes lambda test statistic was computed. Each of the three discriminant analyses produced two discriminant functions associated with statistical significance.

Results of the first discriminant analysis, performed on the demographic data set using the SPSS-X discriminant program (4) are summarized in table 3. Two discriminate variates proved to be highly significant ( $p < .000$ ), with a high percentage of grouped cases correctly classified (72.58 percent). All univariate F tests were significant ( $p < .000$ ). The principal discriminant function accounted for 62.2 percent of the discriminatory power; the second function accounted for 37.8 percent of the discrimination among groups. Since the two discriminant functions are independent, and since both were shown to be statistically and substantively significant, both were examined and interpreted.

Structure coefficients and standardized discriminant weights were used to determine which demographic variables were most important in explaining the two significant discriminant functions in the demographic data set. Before-tax income made the greatest contribution to function 1, followed by fathers' education. Total expenditures and housing status were significant discriminators but of lesser importance in explaining the first function. Conceptually, the principal discriminant function seemed to be discriminating among groups on a socioeconomic status dimension. Focus was on families with high before-tax incomes, highly educated fathers, high total annual expenditures, and homeowners.

The second discriminant function appeared to be profiling families with children under 18, young parents, mothers with relatively low levels of education, urban residents, and children who were not likely to be working. The set of discriminators for function 2 was more difficult to interpret, but it seemed to be emphasizing a family life stage construct dealing with young families with children.

For further clarification of family differences relative to demographic variables, group means (centroids) were graphically plotted for each family type (see figure). Results indicate that the three family groups were significantly separated on the two previously described independent, underlying dimensions. Group 3 (dual-earner families) scored highest (+.16) on the principal discriminant function, followed by Group 2 (traditional families) (-.39), and then Group 1 (nonworking-father families) (-.99). In comparison to traditional or dual-earner families, nonworking-father families seem to have significantly lower socioeconomic status, indicated by lower incomes, fathers who were less educated than mothers, lower expenditures, and more renters.

On the second discriminant function, Groups 2 and 3 (traditional and dual-earner families) exhibited the highest discriminant scores (+.17 and -.02), while Group 1 (nonworking father families) scored lowest (-1.53). Thus, function 2 indicates that nonworking father families have fewer children under 18, smaller families, older parents, more rural residents, and are more likely to have children working part time than traditional or dual-earner families. The centroid pattern is congruent with the descriptive analyses of demographic data for these families.



Finally, a series of Analysis of Variance tests (ANOVA's) with Scheffe comparisons was conducted using the most prominent demographic variables from the first discriminant analysis (3). Results confirmed that before-tax family income, fathers' education, and number of children under 18 were the best demographic discriminators of family type.

A second discriminant analysis, using income variables to explain family group differences, also resulted in two highly significant discriminant functions ( $p < .000$ ). Once again, a high percentage of group cases were correctly classified (73.20 percent). Function 1 accounted for 93.7 percent of the discriminatory power, whereas function 2 accounted for only 6.3 percent of the discrimination among groups. The two underlying dimensions of income that emerged as important constructs were: (1) government support income relative to unemployment and (2) income from earnings relative to use of food stamps. The principal discriminant function manifested sizable, positive structure coefficients for government support income, specifically Social Security, Railroad Retirement, workers' compensation, and Veterans benefits (table 3). Discriminant-score means for the principal function were +4.0 for nonworking-father families, +.02 for traditional families, and -0.11 for dual-earner families.

The second significant function exhibited noticeable structure coefficients for wage and salary earnings and food stamps. Results seem to describe families with high wage and salary earnings and a low tendency to use food stamps. The discriminant mean of dual-earner families on the second function (-.13) was low and negative compared with the mean of nonworking-father families (+.73), and traditional families (+.32). A plot of the group centroids (see figure) in conjunction with ANOVA results, showed that a considerable portion of income in nonworking-father families (group 1) was derived from government support income, that is Social Security, Railroad Retirement, workers' compensation, or Veterans benefits. In contrast, dual-earner families (group 3) were least likely to receive income from government sources. Almost all income in dual-earner families was from earned wages and salaries, and they were not likely to use food stamps. Traditional families were similar to dual-earner families relative to income amounts and sources, but were slightly more likely than dual earners to receive income from government sources and to use food stamps.

A third discriminant analysis examined whether expenditures could be used to explain one- and two-earner family differences. Once again, two significant discriminant functions were produced ( $p < .000$ ), with 72.38 percent of the cases correctly classified. The first function accounted for 88.7 percent of the discriminatory power, whereas the second function explained 11.3 percent of the functions' power to discriminate among family types. The two key dimensions underlying expenditure patterns that differed significantly among groups were: (1) employment-related expenses, and (2) expenditures for tobacco relative to food at home. Examination of table 3 shows that function 1 possessed sizable, positive structure coefficients for employment-related expenditures such as retirement, housing, food away from home, personal care, clothing, and alcohol. The group centroid on function 1 for nonworking-father families (-.91) was high and negative compared with the mean of traditional



(-.21) and dual-earner families (+.10). Function 2 exhibited moderately high, positive structure coefficients for tobacco and a moderately low, negative coefficients for food at home, indicating that families with high tobacco expenditures may have relatively low food expenditures. Discriminant means on the second function were +.10 for nonworking-father families, -.20 for traditional, and +.07 for dual-earner families.

A plot of the group centroids and results of univariate ANOVA's present a profile of nonworking-father families (group 1) with lower employment-related expenditures, higher tobacco expenditures, and lower expenditures for food at home than traditional or dual-earner families. As might be expected, dual-earner families (group 3) had the highest employment-related expenditures, compared with traditional and nonworking-father families. Less understood were findings that indicated nonworking-father families had the highest tobacco expenditures, compared with traditional and dual-earner families, and lowest expenditures for food at home.

### Conclusions

Findings from discriminant analyses suggest that nonworking-father, traditional, and two-earner families are significantly different from each other relative to demographic characteristics, income, and expenditure patterns. Although traditional and dual-earner families exhibited some similarities on the dimensions studied, nonworking-father families appear to be discernibly different from the other two family groups. Specifically, nonworking-father families were older, lower income, and not highly educated. In addition to wage and salary income, almost one-third of family income was from Social Security, workers' compensation, or Veterans benefits. Employment-related expenditures such as contributions to retirement plans, food away from home, personal care and clothing were lower, yet tobacco expenditures were twice as high as the other two family groups.

The primary contribution of this research from a research perspective is empirical support for the intuitive idea that family income and expenditure patterns differ, depending on which parent is not employed and their reason for nonemployment. Multivariate discriminant analysis also provided empirical support for how families differed by identifying key variables relative to family type group differences.

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**Table 1. Demographic characteristics of two-parent families<sup>1</sup> with children, by parental employment status, 1987**

Personal characteristics	One parent not working		Both parents employed
	Father <sup>2</sup> unable to work/ mother employed	Mother caring for family/ father employed	
Scenario number	1	2	3
Number of consumer units (weighted in thousands)	435,093	5,600,270	15,764,124
Size of consumer unit	3.8	4.2	3.9
Number in consumer unit:			
Earners	1.6	1.3	2.4
Children under 18	1.1	1.9	1.6
Children over 18	0.7	0.3	0.3
		Percent reporting <sup>3</sup>	
Age:			
Father:			
<34	18.8	36.0	34.2
35 - 44	15.0	37.7	38.6
45 - 54	27.0	16.8	20.4
>55	39.1	9.5	6.7
Mother:			
<34	23.5	47.8	42.5
35 - 44	30.7	32.5	38.5
45 - 54	20.5	12.4	15.8
>55	25.3	7.2	3.2
Race:			
Father:			
White	85.0	92.1	90.5
Other	15.0	7.9	9.5
Mother:			
White	86.1	92.6	90.6
Other	13.9	7.4	9.4
Education:			
Father:			
Elementary	29.3	8.2	4.8
Some high school	29.8	10.2	9.2
High school graduate	26.7	35.0	35.3
College	14.2	46.6	50.6
Mother:			
Elementary	3.7	9.5	5.2
Some high school	15.2	14.1	7.1
High school graduate	65.5	43.4	43.4
College	15.7	33.1	44.3

See footnotes at end of table.

continued —

**Table 1. Demographic characteristics of two-parent families<sup>1</sup> with children, by parental employment status, 1987 – continued**

Personal characteristics	One parent not working		Both parents employed
	Father <sup>2</sup> unable to work/ mother employed	Mother caring for family/ father employed	
<i>Scenario number</i> . . . . .	1	2	3
Occupation:			
Father:			
White-collar <sup>4</sup> . . . . .	*	49.0	48.4
Blue-collar <sup>5</sup> . . . . .	*	36.5	35.2
Service . . . . .	*	5.2	5.3
Self-employed . . . . .	*	6.2	9.0
Farm and other <sup>6</sup> . . . . .	*	3.1	2.1
Mother:			
White-collar <sup>4</sup> . . . . .	42.7	*	67.9
Blue-collar <sup>5</sup> . . . . .	25.8	*	11.4
Service . . . . .	26.3	*	13.3
Self-employed . . . . .	5.2	*	6.2
Farm and other <sup>6</sup> . . . . .	0.0	*	1.3
Life cycle stage: <sup>7</sup>			
Preschool age children . . . . .	2.9	27.4	21.6
School age children . . . . .	19.9	33.4	31.7
Teenagers . . . . .	24.8	17.8	23.0
Young adult children . . . . .	48.0	18.9	22.7
Adult children . . . . .	4.4	2.5	1.0
Families with children earners:			
Earners . . . . .	54.5	26.6	33.2
Nonearners . . . . .	45.5	73.4	66.8
Housing tenure:			
Homeowner with mortgage . . . . .	47.7	57.4	67.6
Homeowner without mortgage . . . . .	21.1	14.1	12.3
Renter and other . . . . .	31.2	28.4	20.1
Region:			
Urban:			
Northeast . . . . .	12.1	22.1	14.8
South . . . . .	22.4	18.4	21.0
Midwest . . . . .	23.5	25.0	28.0
West . . . . .	9.2	20.5	17.3
Rural . . . . .	32.7	14.0	18.8

<sup>1</sup>Data are for two-parent families, living together, with children, and complete income reporters. Parents (one or both) who were retired or students, or not living together were excluded. Families with a father at home caring for the family/mother employed; mother unable to work/father employed; and both parents not working, are not reported due to too few sample cases. Total number of two-parent families in the usable weighted sample is 21,799,487; 2.0 percent nonworking-father, 25.7 percent traditional, and 72.3 percent dual-earner families.

<sup>2</sup>Unable to work includes ill, disabled, unable to work; unable to find work; or doing something else.

<sup>3</sup>Because of rounding, total may not equal sum of parts.

<sup>4</sup>White collar includes managerial, professional, technical, sales, and administrative.

<sup>5</sup>Blue collar includes precision production, craft, repair, operators, fabricators, and laborers.

<sup>6</sup>Farm and other includes farming, forestry, Armed Forces and other.

<sup>7</sup>Life cycle stage definitions are: preschool age children – oldest child in family under 6 years, school age children – oldest child between 6-13 years; teenagers – oldest child between 14-17 years; young adult children – oldest child between 18-29; and adult children – oldest child over age 29.

\*Not applicable or not available.

Source: U.S. Department of Labor, Bureau of Labor Statistics, 1987 Consumer Expenditure Survey.



**Table 2. Income, income sources, and expenditures of two-parent families<sup>1</sup> with children, by parental employment status, 1987**

Income and expenditures	One parent not working					
	Father <sup>2</sup> unable to work/ mother employed		Mother caring for family/ father employed		Both parents employed	
<i>Scenario number</i> .....	1		2		3	
Before-tax income .....	\$19,996		\$34,746		\$41,477	
After-tax income .....	19,450		31,091		37,666	
Per capita income .....	5,262		8,273		10,635	
Total expenditures .....	20,084		28,419		33,068	
	<u>Mean</u>	<u>Percent<sup>3</sup></u>	<u>Mean</u>	<u>Percent<sup>3</sup></u>	<u>Mean</u>	<u>Percent<sup>3</sup></u>
<b>Income sources</b>						
Earnings <sup>4</sup> .....	\$12,203	61	\$32,587	94	\$40,250	97
Public assistance <sup>5</sup> .....	2,843	14	339	<1	281	1
Unemployment compensation .....	*	*	101	<1	166	<1
Workers' compensation and Veterans benefits .....	2,144	11	69	<1	69	<1
Welfare .....	*	*	50	<1	10	<1
Food stamps .....	*	*	92	<1	26	<1
Combined Supplemental Security Income .....	*	*	26	<1	9	<1
Social Security or railroad retirement ....	3,576	18	236	1	66	<1
Pensions, annuities .....	1,120	6	365	1	202	<1
Asset income <sup>6</sup> .....	108	1	924	3	531	1
Other sources <sup>7</sup> .....	146	1	295	1	147	<1
<b>Expenditures</b>						
Housing .....	\$5,875	29	\$8,760	31	\$9,640	29
Transportation .....	4,985	25	5,492	19	7,215	22
Food at home .....	3,166	16	3,572	13	3,475	11
Food away from home .....	647	3	1,175	4	1,443	4
Clothing .....	797	4	1,605	6	1,803	5
Personal insurance .....	202	1	426	1	489	1
Pension and Social Security .....	1,109	6	2,787	10	3,818	12
Health care .....	1,101	5	1,206	4	1,210	4
Entertainment .....	831	4	1,568	6	1,827	6
Tobacco .....	447	2	293	1	291	1
Alcoholic beverages .....	131	1	227	1	274	1
Personal care .....	214	1	242	1	290	1
Other <sup>8</sup> .....	581	3	1,065	4	1,295	4

<sup>1</sup>Data are for two-parent families, living together, with children, and complete income reporters. Parents (one or both) who were retired or students, or not living together were excluded. Families with a father at home caring for the family/mother employed; mother unable to work/father employed; and both parents not working, are not reported due to too few sample cases. Total number of two-parent families in the usable weighted sample is 21,799,487; 2.0 percent nonworking-father, 25.7 percent traditional, and 72.3 percent dual-earner families.

<sup>2</sup>Unable to work includes ill, disabled, unable to work; unable to find work; or doing something else.

<sup>3</sup>Percent of total annual income or expenditures. Because of rounding, total may not equal sum of parts.

<sup>4</sup>Earnings include salary, wages, business income, and farm income or loss.

<sup>5</sup>Public assistance includes unemployment compensation, workers' compensation, Veterans benefits, welfare, food stamps, and combined Supplemental Security Income.

<sup>6</sup>Asset income includes interest, dividends, rent, and royalties.

<sup>7</sup>Other sources include alimony, child support, and other money income.

<sup>8</sup>Other includes cash contributions, education, reading, and miscellaneous expenses.

\*Not available due to too few sample cases.

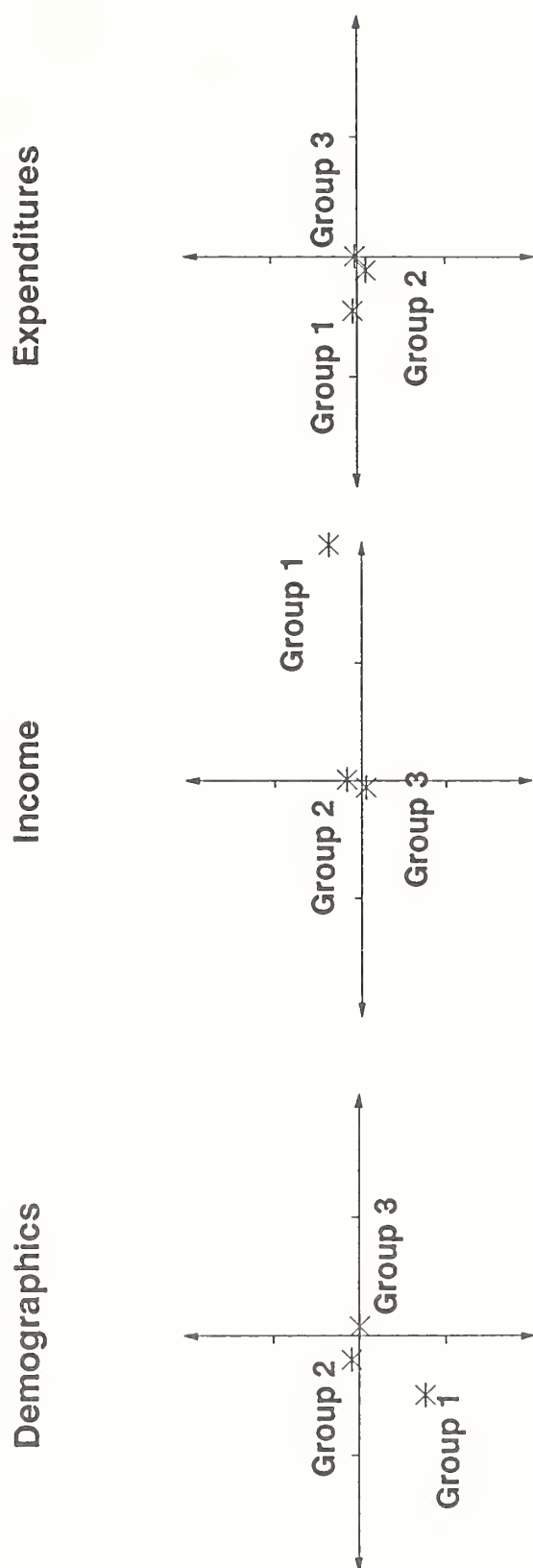
Source: U.S. Department of Labor, Bureau of Labor Statistics, 1987 Consumer Expenditure Survey.

**Table 3. Discriminant analyses of demographic, income, and expenditure variables by family type, 1987**

Variables	Univariate F tests (df = 2/5,471)	Standardized discriminant weights	Discriminant <sup>1</sup> structure coefficients
<b>Demographic</b>			
<u>Function 1:</u>			
Before-tax income .....	89.32*	.534	.634
Education-father .....	82.01*	.319	.553
Total expenditures .....	48.85*	.143	.462
Housing status .....	27.18*	.256	.322
*p<.000			
Wilkes Lambda = .883	Chi square = 681.743	F = 5.508 (df = 210/210,668)	p<.000
<u>Function 2:</u>			
Number of children under age 18 .....	47.29*	.265	.575
Family size .....	36.49*	.260	.434
Age-father .....	44.62*	-.255	-.424
Age-mother .....	30.98*	.087	-.391
Education-mother .....	82.01*	.563	-.385
Residence .....	15.39*	.372	.337
Child earners-working part time .....	15.20*	-.270	-.316
*p<.000			
Wilkes Lambda = .954	Chi square = 260.197	F = 5.508 (df = 210/210,668)	p<.000
<b>Income and Income Sources</b>			
<u>Function 1:</u>			
Social Security or Railroad Retirement .....	554.6*	.833	.787
Workers' compensation or Veterans benefits .....	201.3*	.548	.469
*p<.000			
Wilkes Lambda = .730	Chi square = 1722.177	F = 152.99 (df = 110/214,577)	p<.000
<u>Function 2:</u>			
Wage and salary earnings .....	132.5*	.751	.726
Food Stamps .....	27.6*	-.369	-.492
*p<.000			
Wilkes Lambda = .969	Chi square = 174.654	F = 152.99 (df = 110/214,577)	p<.000
<b>Expenditures</b>			
<u>Function 1:</u>			
Retirement .....	88.18*	.755	.878
Housing .....	28.40*	.177	.488
Food away from home .....	18.35*	-.324	.401
Personal care .....	19.43*	.124	.394
Clothing .....	15.92*	.045	.357
Alcohol .....	13.31*	.137	.342
*p<.000			
Wilkes Lambda = .954	Chi square = 258.936	F = 11.90 (df = 182/211,322)	p<.000
<u>Function 2:</u>			
Tobacco .....	6.64**	.574	.551
Food at home .....	3.95***	-.495	-.456
** p<.001			
*** p<.02			
Wilkes Lambda = .993	Chi square = 36.155	F = 11.90 (df = 182/211,322)	p<.000

<sup>1</sup>Only structure coefficients calculated from the within group correlation matrix that exceeded .30 are reported in this table.

**Figure 1. Discriminant function centroids of the three groups' demographic characteristics, income, and expenditure patterns**



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## OUTLOOK FOR U.S. AQUACULTURE

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The theme for this year's outlook conference is "agriculture in a world of change." Perhaps in no other commodity does the coming year or the coming decade carry as much possibility of change as in the aquaculture industry. The present size and diversity of the aquaculture industry and the attention that it has received illustrates the extent of the changes that have taken place in this industry during the 1980's. However, even more extensive changes may be forthcoming in the 1990's as the aquaculture industry continues to grow and expand into new areas of the seafood industry.

The chief purpose of this presentation is to provide the aquaculture industry with a forecast for the coming year, trying to take into account the many changing economic and social forces that impact it. Since the time frame for developing an aquaculture business is usually longer than one year I am going to extend the time frame of my forecast and talk more in terms of the outlook for aquaculture over the next five to ten years.

Within the next decade the aquaculture industry in the United States is expected to continue to expand, but the rate of expansion will probably slow from that seen in the 1980's. Increases in production will vary considerably from species to species, with the production of newly developing sectors of the industry being the fastest growing.

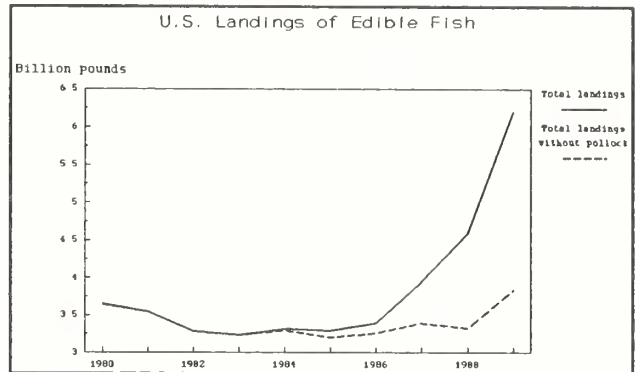
There are numerous factors in both the world and domestic seafood markets that will influence the speed at which the various sectors of the aquaculture industry grow. The number of factors that could affect the aquaculture industry is large, in part because of the wide scope of the industry itself. Aquaculture is defined as the controlled production of aquatic plants or animals for all or part of their life cycle. Therefore, aquacultural production can encompass such products as aquatic plants and algae, fresh or salt water fish, shellfish, mollusks, ornamental fish, and even some reptiles. The changes that will affect the aquaculture industry can basically be separated into those affecting production and those affecting the demand for seafood products.



## Seafood Supply

The commercial supply of seafood products in the United States is made up of four major components; domestic fishery landings, imports, exports, and domestic aquacultural production. Domestic fishery landings along with imports are the major sources of seafood supply. During the 1980's domestic landings of edible products went from 3.7 billion pounds in 1980 to 6.2 billion in 1989. Most of this increase came from larger harvests of Alaskan pollock, which in 1989

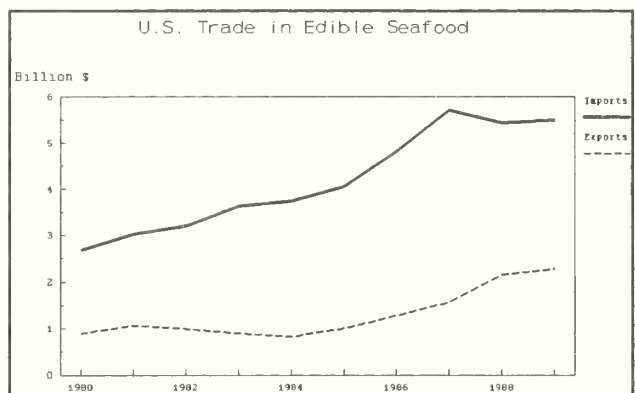
accounted for 39 percent of total landings. Without pollock, U.S. landings would have risen by 0.1 billion pounds during the 1980's, an average annual growth rate of less than 1 percent. On a per capita basis this would not have even kept up with population growth.



It is not realistic to expect that landings of pollock will continue to expand in this fashion in the 1990's. The Alaskan quota for pollock is 2.8 billion pounds. This is still considerably higher than 1989's harvest of 2.4 billion pounds, but shows that there are limits to how much this harvest can expand in the future. Aside from pollock most other species did not show a pattern of increasing landings in the 1980's, and landings of most species are not expected to expand to any great degree in the 1990's.

This forecast is based on efforts to protect species from over harvesting and the closure of some fishing areas due to bycatch problems. First, many fish and shellfish species have quotas on their landings to prevent depletion of the resource. Second, some fisheries management areas have placed strict controls on or stopped certain kinds of fishing or fishing gear to prevent the accidental catch (bycatch) of species whose stocks are endangered or whose yearly quotas have been filled.

In the coming decade, the United States, which is the world's second largest importer of edible seafood, will face increasing competition for seafood products from such countries as Japan, the EC, and other areas with expanding economies. This competition for seafood would be aggravated if the U.S. dollar weakens in relation to other currencies, making imports relatively more expensive. Since the United States is also the world's largest exporter of edible seafood a weakening of the dollar would tend to increase exports. Both these actions would reduce the



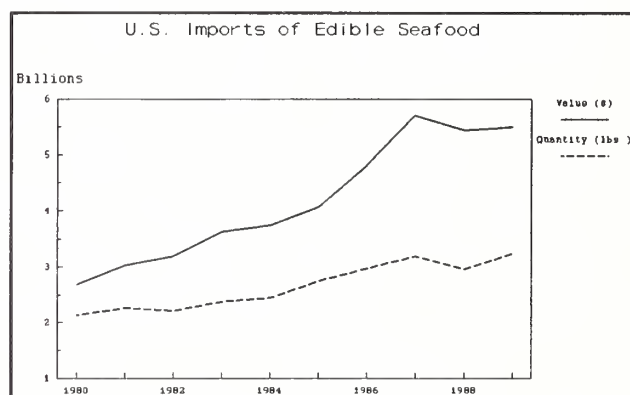
amount of seafood available for domestic consumption.

If exports increase, supplies of edible seafood might not be available from domestic landings to support further increases in U.S. seafood consumption. If higher imports were used to increase consumption, it would be in a competitive market and increasingly costly. One area where production can be increased without the danger of damaging future availability is in aquaculture. The United States has the capacity to produce some multiple of its present aquacultural production, as most species are still in their infancy in terms of commercial development.

### Seafood Trade

Domestic aquacultural production currently is relatively small compared to imports, but continued growth of the U.S. aquaculture industry could help slow the rising demand for imported seafood. If per capita seafood consumption grows as it did in the 1980's and population growth continues at the same rate, the United States would consume an additional 1.5 billion pounds of seafood annually by 2000. If domestic landings of seafood continue there 1980's growth rate (minus pollock), they could only supply a portion of the additional demand. Imports and domestic aquaculture would have to supply the remainder. The production efficiency and marketing success of the domestic aquaculture industry would determine what percentage of this potential market it would be able to capture.

Relatively stable domestic landings for most species and strong growth in domestic demand have led to a sharp increase in imports of edible seafood, from \$2.7 billion in 1980 to \$5.5 billion in 1989. The U.S. exports of edible seafood increased from \$0.9 billion to \$2.3 billion between 1980 and 1989. Thus, the trade deficit has grown from \$1.8 billion to \$3.2 billion.



Domestic aquacultural production may be able to reduce the growth in U.S. imports of fish and shellfish products, but it will not be able to eliminate it completely because of the makeup of the products imported. On a value basis, in 1989 shrimp accounted for 31 percent of total U.S. edible seafood imports. While domestic aquaculture can produce a wide variety of products competitively with other areas of the world, domestic shrimp farming may never meet more than a small percentage of total U.S. demand, due in part to higher land and labor costs.

### Demand for Seafood

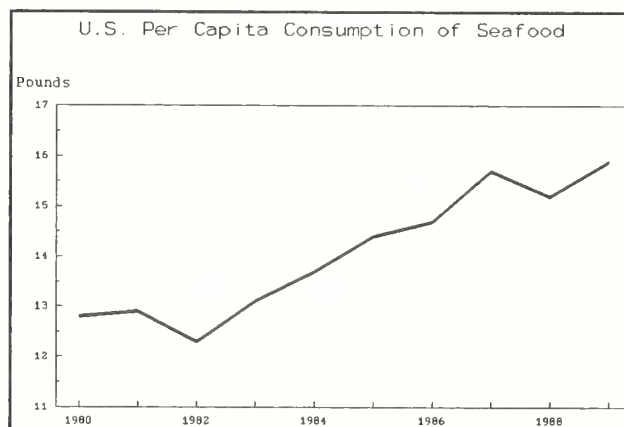
The demand for seafood is a function of a number of factors. Price, of course, is a major factor, but equally important is changes in the price for seafood relative to competing products. Seafood competes for consumer

expenditures with both red meats and poultry.

### U.S. Seafood Consumption

Estimates now place U.S. per capita seafood consumption at 15.9 pounds, a 5-percent increase above 1988's revised figure of 15.2 pounds and 0.2 pound higher than the 1987 record. Seafood consumption has risen in 8 of the last 10 years and is up 24 percent since 1980.

Health concerns are expected to play a large role in the continued growth of seafood consumption. First, many seafood products are low in fats and calories, but high in protein and other nutrients. Second, some seafood products are good sources of Omega-3 fatty acids, which are thought to lower cholesterol levels.



Changing U.S. demographics is another reason for increased seafood consumption. During this decade the average age of the U.S. population is expected to increase and minorities are expected to represent a larger proportion of the total population. Both older people and minorities traditionally consume seafood at higher rates than the population as a whole.

### Differences for Aquaculture

In trying to formulate a forecast for the aquaculture industry there are a number of ways that it differs from other parts of agriculture. First, aquaculture is more diverse than most other sectors of the agriculture industry. Aquacultural production encompasses such diverse products as aquatic plants, fresh or salt water fish, shellfish, mollusks, ornamental fish, and even some reptiles. Although other agricultural sectors include a wide variety of species, in most cases they have many common elements in their production. In aquaculture the environmental needs and the life cycles of the various species vary quite differently. This wide diversity has made it more difficult for the industry to achieve a unified position on issues affecting aquaculture.

Second, aquaculture also differs from conventional farming in that some operations use public waters. Most ocean waters are considered public property that, given certain guidelines, are available for the pleasure of all citizens. This use of public property has some precedent in agriculture, with grazing permits on some public lands in the West as one example. However, in the case of publicly owned lands the government has exerted greater control over the access and use of these lands.

Third, the most important difference between aquaculture and the other sectors in agriculture is the presence of a large wild harvest. The red meat and poultry industries do not have to compete with the wild harvest of cattle, hogs, or chickens, but the farm-raised salmon industry is certainly affected

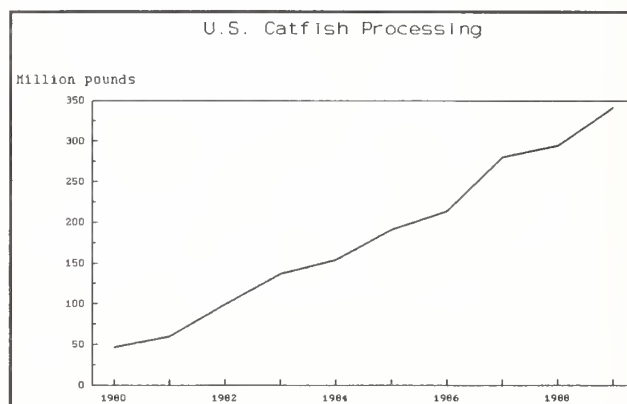
by the U.S. and Canadian wild harvest of Pacific salmon. Although some sectors of the U.S. aquaculture industry do not compete directly with any sizeable wild harvest of the same species, catfish and trout for example, all aquacultural species compete with closely substitutable products from wild harvest.

### Domestic Aquacultural Production

The domestic aquaculture industry should continue to grow, benefiting from increased marketing opportunities due to the expected growth in demand for seafood. However, this does not mean that all sectors of the aquaculture industry will enjoy the same level of success. The following paragraphs give a short description of the outlook for a number of sectors of the aquaculture industry.

#### Catfish

As the largest sector in U.S. aquaculture, the outlook for catfish will greatly affect the outlook for the industry as a whole. Currently, catfish processing volume in 1990 is expected to be up 9 to 12 percent over 1989 and total between 375 and 385 million pounds. In 1991, the catfish industry should continue to show gains in processing near or at the double-digit level. Reported inventory levels of all sizes of catfish and anticipated acreage expansion are adequate to support this type of expansion contingent on no extremely adverse weather. On the demand side deflated processor prices for catfish in 1990 are close to the 1980 level. This stability in real wholesale catfish prices helped processors to continue to expand sales of catfish relative to other seafood products. However, real wholesale prices for some meat and poultry products have fallen since 1980. To compete against these products catfish processors will have to use the influence of fish's image as a healthy food.



#### Trout

A recent survey showed that total sales for the trout industry from September 1, 1989 to August 31, 1990 were \$76.9 million, an increase of 7 percent over the same period a year earlier. For foodsize fish the total poundage sold rose by 2 percent to 56.8 million pounds. Higher production in Idaho was partially offset by declines in California, North Carolina, and Utah. The weighted average price for foodsize fish rose to \$1.14 a pound, up 6 percent.

Trout production should continue to have the growth in production it has shown over the last several years. Increases in production will come chiefly from higher productivity at existing trout farms. The major factor limiting overall expansion of the industry is the lack of suitable sites for production facilities.



### Hybrid Striped Bass

Reliable estimates for hybrid striped bass production are not yet available, but industry estimates have 1990 production increasing a considerable amount and forecast similar production increases for 1991. With an 18 month growout period in most pond systems, the development of a hybrid striped bass production operation can take several years to get started. With the lifting of restrictions on the sale of hybrid striped bass in Maryland, a prime market for this fish is now open. While a few growers have been producing hybrid striped bass for several years, 1990 and 1991 will be the first crop for many growers.

While some of the basic infrastructure is now in place, such as fingerling suppliers and growout operations, a great deal of work remains. Feed trials, optimum stocking densities, and growth reactions to temperature and aeration are among the areas being analyzed to increase production efficiency.

Since no sizable wild harvest of striped bass is expected, growers in many areas have chosen to grow hybrid striped bass on a trial basis. The rate at which hybrid striped bass production expands will be influenced by many factors, but three of the chief ones are:

- o How fast growers can reduce their production costs by adopting improved production techniques.
- o How rapidly prices for hybrid striped bass will decline as new sources of production are opened up.
- o How fast the infrastructure of this sector, supplying such items as fingerlings or stockers, specialized feeds, processing services, and other items can be developed.

### Tilapia

Along with hybrid striped bass, U.S. tilapia production seems poised to expand rapidly in the next decade. Estimates of 1990 production run from 6 to 10 million pounds of live fish. However, the industry's production could double in the next few years. A number of large companies have entered tilapia production and are rapidly moving to expand production. As a white-fleshed, mild-flavored product, tilapia could be substituted for a number of other traditional seafood species. Marketing strategies are also changing from producing whole fish for smaller local and ethnic markets, to developing a brand-name filleted product aimed at a national market.

Tilapia growers are now working on efforts to increase the efficiency of their growing operations, by developing strains that are more disease resistant, higher yielding, and better feed converters. Growers are also working with different feed formulas, comparing various cultural practices, and evaluating ways to achieve single-sex populations. Producers are eager to take advantage of tilapia's rapid growth rate, its chief advantage, and to improve its low meat yield, the chief disadvantage.

Domestic growers will have to become as efficient as possible not only because of competition from other U.S. producers, but because tilapia farming is developing into a worldwide business. As the domestic market for tilapia expands, more foreign producers will begin to target the U.S. market.

### Salmon

In the 1990's the question for the salmon market will be whether aquaculturalists and fishermen can come up with the right mix of promotion and new products to keep demand in line with the increasing worldwide supply.

With U.S. net pen production of salmon at only 10 to 12 million pounds, domestic salmon farmers have little influence on market prices. The total salmon market, which totals over a billion pounds annually, is dominated by the U.S. wild harvest and foreign farm-raised production, especially from Norway.

### Other Fish Species

A factor in aquaculture's huge potential for the United States is the large number of species that may possibly be grown. Although U.S. aquacultural production is presently concentrated in a relatively small number of species, there is considerable interest in fish species suitable for production in Northern and Midwestern areas, where aquaculture is not well established. Some of these species are at the beginning of the experimentation process and others have shown promise for commercial production. A benefit of multiple species production is that it can utilize the competitive advantage of different areas.

Among potential species for cool- or cold-water aquacultural production are sturgeon, arctic char, walleye, and yellow perch. Recent breakthroughs in sturgeon production are an important first step in developing an industry whose long-range goal is to establish a domestic caviar industry. A few operations are already commercially producing arctic char in Canada, and research is underway on the production potential of walleye and yellow perch. If they can be grown economically, they would probably have favorable consumer acceptance, at least in the Midwest.

### Mollusks

Over the last decade, landings of most shellfish have either remained stable or trended downward. Hard clams, seen as a good candidate for aquacultural production, had landings of 9.3 million pounds of meat in 1989, the lowest in 10 years. A number of hard clam farms are now in operation, most on the east coast. With other large hard clam farms in the planning or startup phase, aquaculture is likely to become a significant supplier of hard clams. Research has also indicated that soft clams and surf clams show promise as viable aquacultural species.

Oyster landings amounted to 29.9 million pounds of meat in 1989, down 6 percent from 1988. Landings have fallen for the last 7 years. While aquacultural production of oysters is larger than for any other mollusks, the majority of oysters still come from wild harvest operations. Although there is interest in increasing aquacultural production of oysters in the Chesapeake Bay and the Gulf coast, until disease-resistant strains of oysters are developed, these areas will be handicapped in developing large-scale aquacultural production. There is some possibility that faster growing oysters and off bottom growing systems may allow some oyster farming to be done in areas where the two major oyster disease are prevalent.

While mollusk farming has not received the media attention that fish farming has, there is still a great deal of interest in this type of aquaculture. New species are being tested for suitability to farming operations, and a variety of growing systems are being developed. Due to local water salinity, temperature conditions, and predators, mollusk-growing practices can vary considerably from area to area. However, because they are filter feeders that depend on whatever water body they are in to provide their food, mollusks are probably more vulnerable to pollution or environmental imbalances. The biggest constraint to expansion of mollusk farming will be the limited availability of sites with suitable water conditions.

### Crawfish

While crawfish production remains one of the largest segments of the U.S. aquaculture industry, production in recent years has remained stagnant. There are a number of factors that have held back expansion in the crawfish industry.

First, crawfish are not harvested year round, making plants devoted to processing crawfish less efficient to operate than if they were able to process year around. Product marketing could be expanded to other areas of the country more easily if product were continuously available. This drawback does not affect the processed meat sector of the industry as greatly as the live market, but a steady supply of live product might expand the market for crawfish meat.

Second, the wide range in product sizes increases marketing expenses. To command the highest price, crawfish must be graded by size, since the different sizes have different markets. The largest crawfish, around 8 to 10 per pound, are exported to the Swedish market which pays a premium price for large crawfish. The medium-size product goes mostly to the restaurant market, and the smaller crawfish are peeled for tail meat.

Third, a considerable wild harvest still exists in Louisiana, making it difficult for crawfish producers to plan future production and make independent decisions on expansion.

Most of the growth in U.S. aquacultural production in the last decade has come from the catfish industry. While many other areas of the aquaculture industry are rapidly expanding they are still small in comparison. Continued growth in the established aquacultural industries will come from the development of new production strategies, disease treatments, genetic improvements, and feeds. Emerging aquaculture industries are expected to experience rapid expansion through the adoption of proven production and processing technologies. The ability of the newer aquaculture industries to obtain financial, management, and marketing resources will play a key role in their expansion.

### **Issues Affecting the Aquaculture Industry**

There are a number of issues facing aquacultural producers today that will affect the growth and nature of the industry in the coming decade. These issues will impact the speed at which U.S. aquaculture expands, what species



become major parts of the industry, and where the principal production centers will be located. Some of the major concerns are:

#### Water Quality

For many aquacultural producers water quality is a chief issue facing their industry. Producers, regardless of whether they grow in raceways, ponds, or ocean waters, know that without high-quality water resources they will not be able to continue their operations. Aquacultural producers are vulnerable to contamination of groundwater, aquifers, or marine waters from industrial wastes, agricultural chemicals and runoff, ocean dumping, and other sources of pollution. Any of these sources of pollution can kill fish or shellfish being raised or force authorities to ban or restrict the production or harvesting from those waters until the pollution can be corrected.

The growing number of instances of where water resources have been found to be polluted has raised public concern regarding the safety of seafood and could result in greater regulation of polluting activities. This would provide a long-term benefit for the aquacultural industry, but could also create problems in marketing fishery products if the public perceives that waters are unsafe. Aquaculture producers will have to be able to address people's concerns about product safety if they want to expand their markets to new customers.

#### Waste Disposal

While aquaculturalists must guard against pollution from other sources they must also face the problem of managing the wastes generated by their own production. As production levels increase the amount of waste will also rise. Efficient methods need to be developed to deal with both effluent from waters used for growout and the disposal or alternative use of waste products from processing operations.

#### Government Regulations

In most States, producers starting an aquacultural business are required to obtain numerous State and local permits before constructing facilities or beginning operations. In many cases, local, State, and Federal agencies have overlapping jurisdiction over aquacultural production. Some aquacultural organizations are now putting together guidelines for new operators regarding what permits are needed, who to contact, and when they must be obtained.

For producers seeking permits to lease sites on State-held rivers or ocean bottoms, the process can be even more difficult. In most States, an application for use of public lands must go through a series of public hearings. Many State plans for leasing ocean sites have been opposed by a number of groups. If marine aquaculture is to expand in the United States producers will have to develop some type of compromise with these various groups.

#### Seafood Inspection

The issue of seafood inspection has generated debate regarding whether it is needed and what agency should oversee the program. Another question is the impact an inspection program might have on aquaculture and the wild harvest seafood industry. Mandatory seafood inspection will remain an issue as the



general public attitude is for more safeguards for the food we consume. A likely result of the institution of a seafood inspection would be an increase in confidence in seafood's safety and increased consumption.

Mandatory seafood inspection bills were passed by both the Senate and the House of Representatives in the past session. The chief difference in the bills was what agency would take the lead role in the inspection program. Due to the limited time available a workable compromise could not be developed in the conference committee before Congress was adjourned. Therefore the bills will have to be reintroduced in the next Congress.

#### Recirculating Systems

The advent of cost-competitive recirculating systems could change the present competitive advantages that some areas currently maintain. Recirculating systems normally grow fish at high densities and therefore require less land to produce a given output, diminishing the advantage of areas with low land costs. Indoor recirculation systems would tend to diminish the advantage warm climates have in growing some species. As these systems continue to improve aquaculturalists will have to stay aware of the potential opportunities and industry changes presented by this technology.

#### Therapeutic Compounds

As aquaculture has grown producers have looked for ways to increase the productivity of their operations, by raising the population density. As the density of fish per volume of water increases so does the possibility of diseases. One problem facing aquaculturalists has been the lack of therapeutic compounds approved for use on fish destined for human consumption. The industry needs to have some form of review process developed for chemicals needed in the production and processing of various species.

Numerous other issues, such as health and environmental concerns, animal rights, foreign competition, and trade conflicts will also affect aquaculture as they impact the production and consumption of aquacultural products, seafood, and other competing products.

#### Summary

The forecast for the aquaculture industry given the many changes taking place not only within the industry, but from competing industries, can be broken down into four areas. First, increasing consumer demand for fish and shellfish products and relatively stable domestic landings of many wild species should enhance the continued expansion of U.S. aquaculture. Second, the production of most aquacultural species are relatively new industries. As such, many basic production questions are still being researched. As research examines areas such as disease prevention, genetic selection, nutrition, predator control, and grading and harvesting techniques, growers will be able to increase their production efficiency. This in turn will allow aquaculture to be more competitive with competing products. Third, while the basic infrastructure is now in place for the expansion of the domestic aquaculture industry, producers will have to successfully deal with a variety of issues that could restrict future growth in the industry. Fourth, although domestic

aquaculture producers will have a growing market at home they will be faced with increased competition from foreign producers as aquaculture expands worldwide.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## CATFISH INDUSTRY PERSPECTIVE

Hugh Warren

Executive Vice-President, Catfish Farmers of America

The prominence of the catfish industry within aquaculture becomes more obvious as it is most often used as the gauge to determine the success or failure of the total U.S. aquaculture effort. Although aquaculture contains great diversity of species and technology, the production of farm-raised channel catfish represents better than one-half of the annual volume produced from all species.

Growing numbers of Americans are now regular consumers of this product, that for the most part, has been through a government inspection process, reached the market place in a fresh appealing package with consistent pricing.

The National Fisheries Institute reports that this last year farm-raised catfish made the top five most popular seafoods in the U.S. The rankings are: (1) Tuna, (2) Shrimp, (3) Cod, (4) Alaskan Pollock (Surimi), and (5) Catfish. Per capita U.S. consumption of catfish is .75 pounds, a one pound increase would cause the present industry to double in size, which explains the optimism for continuing growth potential.

In the 1980's the catfish industry experienced a compound annual growth rate of about 25%. Projection for the 1990's indicate that if the industry achieves a compound annual growth rate of even 10%, catfish will be a billion-pound industry by the year 2000.

Dietary considerations have especially stimulated this growth. In recent years, changes have been noted in the demand for various products as government research institutions have called for increased consumption of grains, chicken, fish and fruits and a decrease in amounts of red meat and dairy products with high fat content.

In addition, the decision by the processors to maintain their own refrigerated delivery fleet, enabled them to have a fresh product almost anywhere in the country for consumer

sales.

The U.S. aquaculture industry as it moves in the 1990's is still young and growing. Aquaculture has been promoted as an answer to a host of food and employment problems. During the 80's trial and error farming methods and the transfer of research knowledge finally resulted in the development of viable business operations.

In the early market assessment state, there was concern over the threat from imported catfish that in 1970 accounted for sixty-five percent of the entire fresh water sales. The fact that in 1989 imported catfish represented only four percent of total sales supports the adage that a superior product, properly marketed, can overcome less expensive fresh water competition.

Channel catfish production is by far the largest aquacultural enterprise in North America. Production for 1989 was 342 million pounds from 150,000 acres of ponds. The Mississippi River delta area of the states of Mississippi, Arkansas and Louisiana and parts of Alabama produces ninety percent of the world's farm-raised catfish volume from static water ponds 4 to 5 feet deep filled with water from fresh water wells that minimize heavy mineral or chemical contamination.

The environmental advantages enjoyed by these areas are warm climate with temperatures in the optimum catfish eating and conversion range of 80 to 85 degrees fahrenheit. Catfish eat little feed and therefore have no weight gain when the temperature falls below 60 degrees. This warm weather also means that harvesting is possible nearly year round for continuous processing and inventory control. Heavy clay soils, that hold water well, limit water loss to natural evaporation to help conserve the water resource. This presently abundant water comes from shallow wells drilled into the aquifers close to the surface.

Currently, a rule of thumb used by financial institutions for the minimum economic farm size is 80 acres or more of ponds that will need up to 18 months to produce the 4,000-5,000 pound per acre yield at a present day pond bank price of about 80 cents per pound.

The cost of developing a catfish farm and bringing the first crop of fish to market can be \$3,000-\$5,000 per acre.

The farmer owned feed mills use locally grown soybeans and other grains to formulate feeds that give superior conversion rates. Catfish have a feed to gain ratio of approximately two pounds of feed to produce one pound of live fish. The conversion rates for other protein sources are one to eight for beef,



one to four for pork, and one to three for chicken.

Catfish feed, which is usually the highest unit of cost input, is a high protein floating food pellet. The floating feed gives the fish farmer the opportunity to monitor the fish and their feeding behavior as to indications of general health and pond condition.

Seafood wholesomeness and safety are a continuing concern of the consumer, especially in the glare of publicity of recent fresh water and ocean pollution. To counter this fear, the vast majority of U.S. catfish processing companies pay to have their products and plants federally inspected by the U.S. Department of Commerce, National Marine Fisheries Service and then promote this reassuring safety feature to their buyers.

Another important element in catfish's success has been the overall commitment to quality.

Once the fish have reached the market size of about one and one-quarter pound, sample fish are caught from each pond and taken to the processing plant for a quality control testing. If at any time these samples are under standard, the entire harvest from that pond is rejected. Off-flavor continues to be a major cause for rejection. The off-flavor syndrome can give the fish a muddy or musty taste that can last from weeks to several months. Research to date has not found a solution for the blue-green algae that grows in pond water during the warm weather months that causes this problem.

The fish are harvested with seines and loading baskets and placed in aerated tank trucks for shipment to the processing plants. They are kept alive right up to the minute they are processed, making them among the freshest fresh-water fish available on today's market. The entire processing procedure is completed in as little as thirty minutes. The fish are cleaned, processed and either placed on ice or individually frozen to temperatures of 40° below zero, using a quick-frozen method that preserves the taste and quality of the fish.

Last year fifty-three percent of the fish were frozen with the remaining forty-seven percent going to the fresh market. The preferred product forms for these fish were fillets at forty-five percent of the total market and then whole fish making up thirty-five percent.

The four largest processing companies which represent the vast majority of total volume are structured into three types of ownership. Delta Pride, the top ranked company with four plants in Mississippi, is a cooperative owned by 180 fish farmers and has the processing potential of up to 3 million pounds per week. Agri-business giants Con Agra and Hormel are the second and third

place operations that retain corporate management control with the local Mississippi delta offices. A family owned company in Alabama, Southern Pride, completes the current top four ranking. In all, USDA lists thirty-four commercial catfish processing plants.

All of these companies have their own "in house" marketing departments and plan their independent strategy. However, in 1986 an added dimension was created to promote farm-raised catfish at the consumer level. Since then The Catfish Institute has been responsible for generic advertising and promotion to increase public awareness and acceptance of catfish. The funding for TCI comes from contributions of \$6 for every ton of catfish feed sold by three major feed mills. This annual funding of \$1.5 to \$2 million dollars is managed and directed by an elected board with representation from these feed mills.

TCI's first advertising year, 1987, had a simple but ambitious plan, to make every consumer in the U.S. aware of the benefits of purchasing and consuming farm-raised catfish. Full color ads in consumer publications like Better Homes & Gardens, Family Circle, Time, Newsweek and People were used to get the message across. At year end, combined with the individual marketing campaigns conducted by processors an almost 30% sales gain was achieved.

In 1988, the strategy involved working in the heartland of the southern influence, with the reasoning that it is easier to get someone to eat more of a product they already enjoy than to get someone to buy it for the first time; catfish went head to head with beef, pork and poultry. Comparisons were made showing USDA figures for the calories, cholesterol and fat contents of these land animal proteins contrasted with catfish.

With consumer reaction to the much publicized pollution possibilities in ocean fish, the 1989 effort was changed to emphasize the wholesomeness and quality of farm-raised catfish from controlled environments.

This same quality assurance message is being carried over to this years print media effort and taking another step to position catfish into a more sophisticated setting with new elegant recipes and pictures to upgrade the product out of the fast-food category. Attention is being focused on the middle level of chefs and retail seafood buyers to help in creating this different perception.

Wanting to maximize the promotional effort with somewhat limited funds, TCI is not advertising in the heartland area this year but changing emphasis to the states that form a halo around the tradition market area. States such as Arizona, Colorado, and the Carolinas are well within the distribution system and en-

joy a high standard of living that offers tempting consumer markets.

Catfish Farmers of America is the trade association that represents the catfish industry. Membership comes from 35 states and is made up of producers, suppliers, processors, marketers and academia. Primary functions of CFA are government and industry relations, research initiatives, member services and conventions. Timely news and information is provided by the monthly issues of our official publication, The Catfish Journal. With the industry having its own "in house" newspaper, important subjects can be brought to light quickly and decisions and reactions rapidly formulated. Industry leaders meet for CFA board meetings on a regular basis to set policy and address issues in the industry.

The most recent action that has had a major impact on the industry was the organizing of the Catfish Bargaining Association.

In the fall of 1989, a group of Mississippi farmers formed a bargaining association, that has allowed them to establish the pond bank price for their fish. This association was formed along the lines of agricultural specialty crops in California. Basically each member farmer agrees to sell his fish only to those processing plants that have agreed to recognize the CBA as the farmer's agent and pay the set price for these fish. These set prices are subject to review in response to changing market conditions. Only time will tell if this new system will work.

At the national level, it is most encouraging to see steps toward implementation of the December 1989 Memorandum of Understanding between the Fish and Wildlife Service of the U.S. Department of the Interior and the U.S. Department of Agriculture. Both agencies are now staffed with capable and energetic aquaculture coordinators charged to define procedures for planning, developing and implementing Federal programs to assist commercial aquaculture. This to be done step in step with what is consistent with the sustainability and enhancement of our natural resources. My personal involvement and observation of these coordinators has convinced me that they are committed to cooperative efforts in achieving these stated objectives.

The U.S. farm-raised catfish industry certainly has its share of problems and it would be incorrect of me to leave a perception otherwise. Catfish farming is an intensive operation that requires heavy capitalization, long work hours from skilled personnel and unpredictable restrictions on cash flow.

Each year new or expanded markets must be found to handle the additional production of fish from new pond construction and improved yields from existing ponds. Actually, most growth in volume is coming from advances made in technology and farming



techniques to increase yield per water acre.

David Harvey, Commodity Economics Division within USDA has already discussed, in his presentation, the issues affecting the growth and nature of the aquaculture industry as a whole.

I would like to comment on some additional specific problems of the catfish industry.

While red meat and poultry producers enjoy a vast array of approved and registered therapeutants, only four are registered and approved for use in commercial aquaculture. The industry's relatively small size is discouraging research by the animal health companies on preventing losses from disease with therapeutants, because they can not justify the registration expenditures. In its 1988 report, the Interagency Joint Committee on Aquaculture identified this lack of approved therapeutants as a major obstacle to future growth.

As with any developing industry, it is hard to keep one segment from getting out of line with the others. This is the case of our having too many processing plants for the number of fish grown.

A recent survey of 38 processors shows a processing capacity of well over 600 million pounds of catfish annually- about double the current level of farm production.

Because of fixed cost, these processors are forced to run as much volume as possible in order to come close to profits. Pressure then remains on wholesale prices as inventory must be moved. In the last two months, three plants have closed their doors and probably more will follow.

Catfish Farmers of America had actively supported the passage of a mandatory seafood inspection program during this past term of Congress. Frankly we see such an inspection process as a method of building consumer confidence in the safety of seafood products. CFA endorsed the Senate passed bill, 2924, the Fish Safety Act of 1990 as the appropriate vehicle with USDA designated as the lead agency. We were disappointed however, when the House passed a substitute amendment (formally HR 2511) which placed the authority for seafood inspection with the Food and Drug Administration and the National Marine Fisheries Service. As a result the House and Senate were unable to reconcile the differences and the bill died.

Our point of view is that it is logical for fish and fish products to receive equivalent treatment in the inspection process as beef, pork and poultry.

In conclusion of this part of my presentation: I believe that the farm-raised catfish industry will expand moderately as



research and technology overcome barriers that will allow per unit fish cost to be reduced and the fish farmer will continue to furnish the consumer with a value filled product.

At this time I would like to acknowledge sources for information included in this presentation.

David Harvey, Agricultural Economist, USDA

Dr. Jane Barnett, Canadian Association of Fish Exporters,  
Ottawa, Ontario

Bill Allen, The Catfish Institute

Mike McCall, The Catfish Journal

Thank you for your attention and I appreciate the opportunity to represent catfish during this 1991 Outlook Conference.

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## OUTLOOK FOR FEED GRAINS

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### Introduction

The 1986/87 world coarse grain ending stocks were a record high 234 million metric tons and the stocks-to-use ratio (S/U) was 29 percent. However, coarse grain ending stocks for 1990/91, following four consecutive years of drawdown, are forecast to fall to 115.4 million tons. The S/U at 14 percent is the lowest since 1973/74. What important U.S. events brought about this dramatic drop in stocks in four years? More importantly, what global events will likely shape the next few years?

#### U.S. Events: 1986 To Present.

Policy and the weather contributed greatly to lower stock levels. Under the 1985 Farm Bill, lower loan rates and the use of certificates allowed U.S. feed grains to compete internationally. The U.S. annual acreage reduction programs, the long-term Conservation Reserve Program, and below normal production in 1988 and somewhat below normal in 1989 helped to reduce supplies. Feed grains are competing in the world markets, domestic use is optimistically approaching record levels, and the market is poised for the next events to shape the future.

#### Major Global Factors of Today.

Going into 1991, there are several key factors which will likely impact feed grains possibly for years to come. These factors include: (1) the 1990 Farm Bill; (2) the changing political and financial situation and role of the market in decision making in the USSR and Eastern Europe; (3) the Mideast situation;

(4) the Clean Air Act; (5) the General Agreement on Tariff and Trade (GATT) negotiations; and (6) the macroeconomic outlook. I would like to begin by discussing the 1990/91 situation, then make a few comments on the 1991/92 outlook and conclude with a few remarks on longer-term prospects.

### 1990/91 Situation<sup>1</sup>

#### Foreign Coarse Grains.

World production of coarse grains is forecast to rise 2.5 percent to 820 million tons, the highest in 4 years. The largest increases are forecast for the Soviet Union, the U.S., and China. World consumption of coarse grains is forecast down marginally in 1990/91, the first year-to-year drop since 1985/86. However, production will still trail use, leading to another reduction in world stocks.

Foreign output of coarse grains is forecast up 2 percent to a record 590 million tons. Although much of the Northern Hemisphere experienced favorable growing seasons, a wide swath of Southern Europe had an extended period of dry conditions, which cut production of spring-planted crops. Output in Eastern Europe and the European Community (EC) is forecast down 11 and 7 percent, respectively, mostly because of lower corn production.

World trade, at 91 million tons, is forecast to decline nearly 10 million from the the unusually strong volume in 1989/90. The anticipated reduction in trade largely stems from a one-third drop in Soviet imports and sluggish demand by several other importing countries.

Soviet coarse grain output is likely to increase about 9 percent, to a near-record despite some problems with the corn crop. Harvest and marketing losses continued large. While State procurement of grain from soviet producers are up over last year, they remain well below targets. This factor suggests continued large import needs, but economic and financial problems are apparently limiting import purchases.

Plentiful world wheat supplies and large export subsidies have pushed export prices to levels where they compete favorably with coarse grains as a feed substitute, even though there are not large amounts of "feed" quality wheat available.

The U.S. share of coarse grain exports is expected to decline slightly to 66 percent from the estimated 69 percent for 1989/90. The 1989/90 market share percentage was the second highest on

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<sup>1</sup>Except as noted all comparisons are to the 1989/90 marketing year.

record, surpassed only in 1979/80. The loss in market share is expected to be in sorghum and barley.

A number of changes in exportable supplies are projected among the competing coarse grain exporters, but these changes are largely offsetting. The biggest year-to-year gain in exports is expected in China's corn exports, followed by smaller gains for Argentina's corn crop and Canada's barley exports. A small increase in EC barley exports is forecast, but this is likely to be more than outweighed by a substantial fall in EC corn exports because of a sharply lower crop in France. Lower production is also forecast to mean reduced corn exports by South Africa and Thailand. A combination of higher domestic use and a decline in production is forecast to trim Australia's barley shipments.

The combined 1990/91 production in the major oat exporters—Canada, Finland, and Sweden—is forecast to be the highest since the mid-1970's. However, since domestic consumption in each of these countries has declined considerably since then, they will have large supplies available for export. Excellent weather largely explains the bumper harvests as area was down from the previous year in Sweden and Canada and about equal in Finland. Despite low prices, the U.S. will again be the principal market for each of these suppliers, and easily the world's largest oat importer.

In summary, October-September 1990/91 world coarse grain trade is forecast to decline 10 percent, mostly because of lower corn exports, with the U.S. market share declining marginally to 66 percent.

#### Domestic Situation.

Feed Grains (See Table 1). Area harvested to feed grains in 1990 is forecast down 1.6 million acres from the 1989 level. Corn harvested area is forecast up 1.9 million acres, down 3.5 million for sorghum, barley, and oats, combined.

Higher yields more than offset lower harvested area, to post a forecast 4 percent increase in production. Corn yields are forecast up about 2 percent while gains in sorghum, barley and oats yields range from 9 to 14 percent.

Even with the larger production, total feed grain supplies are down 4 percent because of a 30-percent decline in beginning stocks. Total supplies are down for each of the feed grains, with the exception of oats.

Feed grain disappearance is expected to decline about 2 percent to 237.9 million tons. Feed and residual disappearance is forecast at 139.2 million tons and food, seed, and industrial (FSI) use at 39.7 million tons, up 4 and 3 percent, respectively, from 1989/90 levels. Exports are expected to decline 16 percent, more than offsetting the forecast increase in domestic use.



Ending stocks are forecast to decline to 39 million tons, a level not experienced since 1976/77. The ending stocks-to-use ratio would be 16.4 percent, the lowest since 1975/76.

Corn (See Table 2). Even though production is forecast to be up a little over 400 million bushels in 1990/91, total supplies are estimated to be almost 180 million bushels lower because beginning stocks are down more than 580 million bushels. Corn yields are forecast at 119 bushels per acre, up 2.8 bushels from last year, but below the record 119.8 bushels per acre in 1987.

Corn feed and residual use is forecast at 4,700 million bushels, an increase of about 5 percent above 1989/90 due to continued profitability in the livestock sector. While favorably priced wheat will likely substitute for some feed grains, the bulk of the substitution likely occurred last summer or the last quarter of the 1989/90 corn marketing year.

FSI use is expected to increase about 2 percent to 1,320 million bushels. Most of the gains continue to be in the wet milled products, with largest increases in the production of high fructose corn syrup and alcohol.

Exports are expected to decline to 2,025 million bushels, following 4 consecutive years of year-to-year increases, because of generally lower world trade. The U.S. share of the world corn trade is expected to about equal last year's share.

U.S. 1990/91 corn ending stocks are forecast to continue the pattern of the last 4 years and drop to 1,236 million bushels, the lowest level since 1983/84. The S/U ratio is forecast at 15.7 percent, also the lowest since 1983/84.

Market prices are expected to average between \$2.20 and \$2.60 per bushel, comparable to \$2.36 in 1989/90.

Grain Sorghum. Production for 1990 is forecast at 560 million bushels, down 9 percent from 618 million. Lower harvested area is being only partially offset by higher yields. Since beginning stocks are down a half from a year earlier to only 220 million bushels, total supplies are expected to be down to 278 million bushels, or 26 percent.

Total use is expected to decline 158 million bushels, primarily because of lower supplies. Exports and domestic use will likely share in the decline by 82 and 76 million bushels, respectively.

Even with the expected decline, use will still exceed production, and ending stocks, at 100 million bushels, are forecast to be at their lowest level since 1975/76. Even with the tight stock situation, prices will likely average between \$2.00 and \$2.40 per bushel, as wheat and other feed grains will quickly be substituted in domestic use or exports if sorghum prices rise above their historical relationship to the other grains.

Barley. Lower harvested area and higher yields provided largely offsetting changes resulting in 1990 barley production of 419 million bushels, marginally above 1989. However, with beginning stocks down 35 million bushels, total supplies are estimated to fall 20 million below 1989/90.

Total use is forecast to decline slightly from last year's 454 million bushels but still exceed production. Ending stocks will likely fall to 150 million bushels, down from the 161 million carryin level.

Barley farm prices are expected to average between \$2.10 and \$2.30 per bushel, compared with \$2.42 in 1989/90.

Oats. Oats production in 1990 is estimated at 358 million bushels, down 4 percent from 1989. Lower harvested area was only partially offset by higher yields. However, unlike the other feed grains, oats supplies are estimated to increase, as larger beginning stocks more than offset the lower production and forecast imports.

Total use is forecast at 451 million bushels, up 17 percent, mostly because feed and residual use is expected to be boosted by the low prices. As a result, ending stocks are projected to decline to 125 million bushels. Even though stocks are tighter than in 1989/90, prices will likely average between \$1.10 and \$1.20 per bushel, much lower than \$1.49 per bushel in 1989/90.

### 1991 Outlook

The new legislation offers 1991 Feed Grain Program participants new planting flexibility options. Participating producers will be able to plant any crop, except fruits or vegetables (unless designated by the Secretary), on up to 25 percent of the their base. The first 15 percent, referred to as normal flexible acreage (NFA), is not eligible for deficiency payments, regardless of the crop planted on these acres. On the additional 10 percent, referred to as optional flexible acres (OFA), participating producers must forgo earning deficiency payments in order to plant an alternative crop. On the NFA, without the influence of target prices, market prices will play a larger role in planting decisions balanced by longer-term considerations such as crop rotation and diversification to other crops.

Analysis of the potential impact of the new legislation on corn planting focuses on the corn-soybean breakeven price relationships, since in much of the Midwest, soybeans compete directly with corn for the same acreage. (See Chart 6) Table 3 shows potential breakeven prices for selected commodities and suggests that corn competes favorably with these selected commodities based on the assumed yields and prices.

The 1991 corn acreage reduction program (ARP) may not be less than 7.5 percent. Assuming the minimum ARP level and little net shift in corn planting because of the flexibility provisions, 1991 corn area would be expected to be 1 to 3 million acres above this year. Yield gains from the current forecast 1990 level similar to the long term trend increases of 1.5 to 2 bushels per acre would result in 1991 production ranging from 200 to 500 million bushels above this year's 7,935 million bushels. Year-to-year production gains near the bottom of the range would largely be offset by the forecast reduction in 1990/91 carryout stocks. However, an increase near the top end of the range would allow for a substantial increase in use.

### Long-Term Outlook

1990 Farm Bill. The 1990 Farm Bill provides participating producers flexibility to adjust plantings on a portion of program acreage, allowing producers to respond to market signals and adjust crop rotations.

Soviet Union/Eastern Europe. Given the current political, economic, and financial turmoil, prospects over the next few years are uncertain. However, if their economies improve and gains in production efficiency are realized, these countries would move toward self-efficiency and possible compete for export markets.

Mideast Situation. As long as oil prices stay high, ethanol will be relatively more attractive for fuel blending.

Clean Air Act. Under these provisions, selected large metropolitan areas will be required to meet specified air quality standards beginning October 1, 1992 through January 1, 1995. To achieve these requirements, one alternative is to blend gasoline with ethanol.

GATT. By-products of the wet milling process include corn gluten feed and meal which are used as protein supplements and compete directly with soybean meal. Up to now, most corn gluten feed has been pelletized and shipped to the EC, but in light of the GATT negotiations, the EC has become sensitive to corn gluten imports from the U.S. and would likely resist large import volumes. Consequently, corn gluten and meal would likely substitute for protein sources in the domestic market, primarily soybean meal.

Macroeconomic Outlook. While the USSR has been a large importer of feed grains in the last couple of years, the largest growth market is the less developed countries (LDCs). A necessary condition to realize this growth is an expanding economy and incomes. However, if a global economic slowdown would occur, the LDCs ability to purchase grains for feeding would suffer.

**Table 1. U.S. Feed Grain Supply and Use, '89/90 & '90/91**

Items	1989/90 Estimate	1990/91 Forecast	Changes from Prior Year
	Mmt		Percent
Beginning stocks	65.9	45.5	-31
Production	221.1	230.1	+4
Total supply	288.4	276.9	-4
Feed and residual	134.3	139.2	+4
Food, seed, and industrial use	38.7	39.7	+3
Total domestic use	173.0	178.8	+3
Exports	69.9	59.0	-16
Total use	242.9	237.9	-2
Ending stocks	45.5	39.0	-14
	Percent		Pctg Pts
Stocks/Total use	18.7	16.4	-2.3



**Table 2. U.S. Corn Supply and Use, '89/90 & '90/91**

Items	1989/90 Estimate	1990/91 Forecast	Changes from Prior Year
	Million Bushels		Percent
Beginning stocks	1,930	1,344	-30
Production	7,527	7,935	+5
Total supply	9,460	9,281	-2
Feed and residual	4,458	4,700	+5
Food, seed, and industrial use	1,290	1,330	+3
Total domestic use	5,748	6,020	+5
Exports	2,367	2,025	-14
Total use	8,115	8,045	-1
Ending stocks	1,344	1,236	-8
	\$ per bushel		
Avg. market price	2.36	2.20-2.60	-7 to +10
Loan rate	1.65	1.57	-5
	Percent		Pctg Pts
Stocks/Total use	16.6	15.4	-1.2%

Table 3. Estimated National Level Breakeven Prices On Normal Flexible Acreage: Corn vs. Selected Commodities

Item	Selected Commodity								
	Wheat	Sorghum	Barley	Oats	Cotton	Rice	Soybeans	Corn	
Assumptions:									
Unit	:	Bushels	Bushels	Bushels	Bushels	Pounds	CWT	Bushels	Bushels
Variable Costs/Ac. 1/:	:	\$53.63	\$65.36	\$61.23	\$48.51	\$291.16	\$353.41	\$62.64	\$142.92
Expected Yield/Ac.	:	38.5	65.5	54.0	57.5	620.0	56.64	33.5	120.5
-----									
	:	per unit							
C	:	\$3.76	\$2.39	\$2.82	\$2.43	\$0.62	\$7.85	\$4.59	NA
O	:	\$3.93	\$2.49	\$2.94	\$2.54	\$0.63	\$7.96	\$4.78	NA
R	:	\$4.10	\$2.59	\$3.06	\$2.65	\$0.64	\$8.08	\$4.98	NA
N	:	\$4.27	\$2.69	\$3.18	\$2.77	\$0.65	\$8.19	\$5.17	NA
	:	\$4.43	\$2.79	\$3.30	\$2.88	\$0.66	\$8.31	\$5.36	NA
P	:	\$4.60	\$2.88	\$3.42	\$2.99	\$0.67	\$8.42	\$5.56	NA
R	:	\$4.77	\$2.98	\$3.54	\$3.11	\$0.68	\$8.54	\$5.75	NA
I	:	\$4.94	\$3.08	\$3.66	\$3.22	\$0.69	\$8.65	\$5.95	NA
C	:	\$5.11	\$3.18	\$3.78	\$3.33	\$0.70	\$8.77	\$6.14	NA
E	:	\$5.28	\$3.28	\$3.90	\$3.45	\$0.71	\$8.88	\$6.33	NA
	:	\$5.45	\$3.38	\$4.02	\$3.56	\$0.72	\$9.00	\$6.53	NA
	:	\$5.62	\$3.48	\$4.14	\$3.67	\$0.73	\$9.11	\$6.72	NA
	:	\$5.78	\$3.58	\$4.26	\$3.78	\$0.74	\$9.22	\$6.92	NA
-----									

1/ Variable costs assume \$30/bbl. oil prices.  
NA = not applicable.

Chart 1

# ENDING S/U RATIOS: WORLD

COARSE GRAINS, 1980/81-1990/91

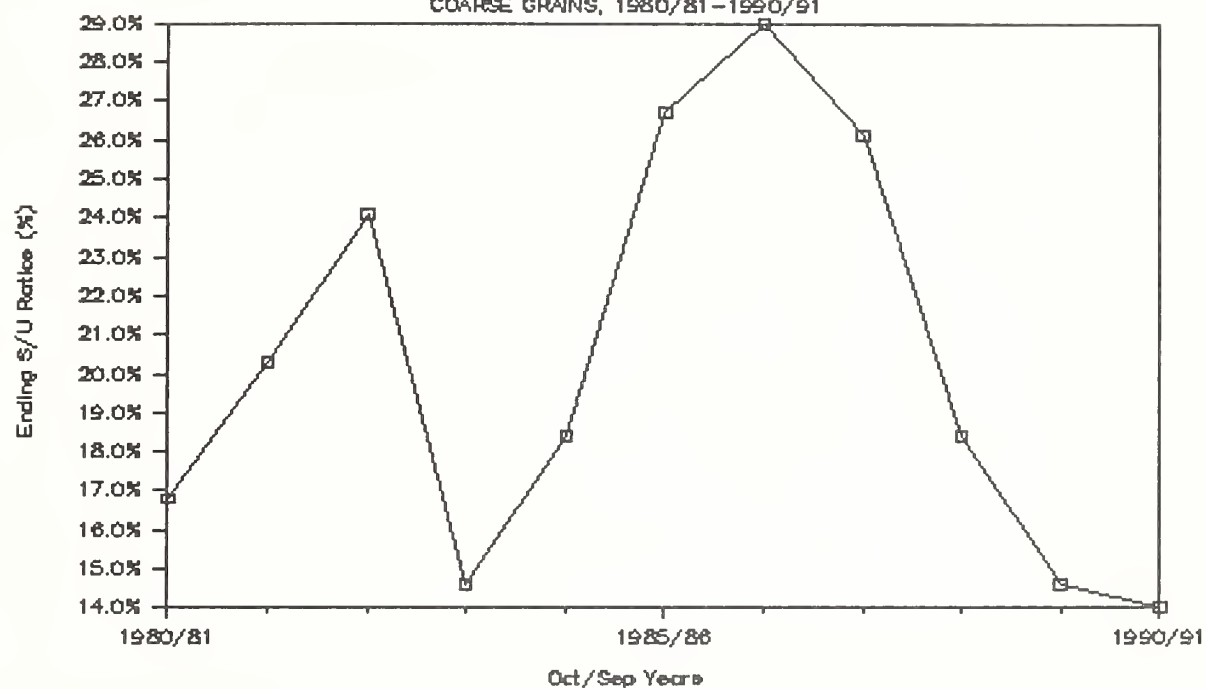


Chart 2

# ENDING STOCKS: U.S. SHARE OF WORLD

COARSE GRAINS, 1980/81-1990/91

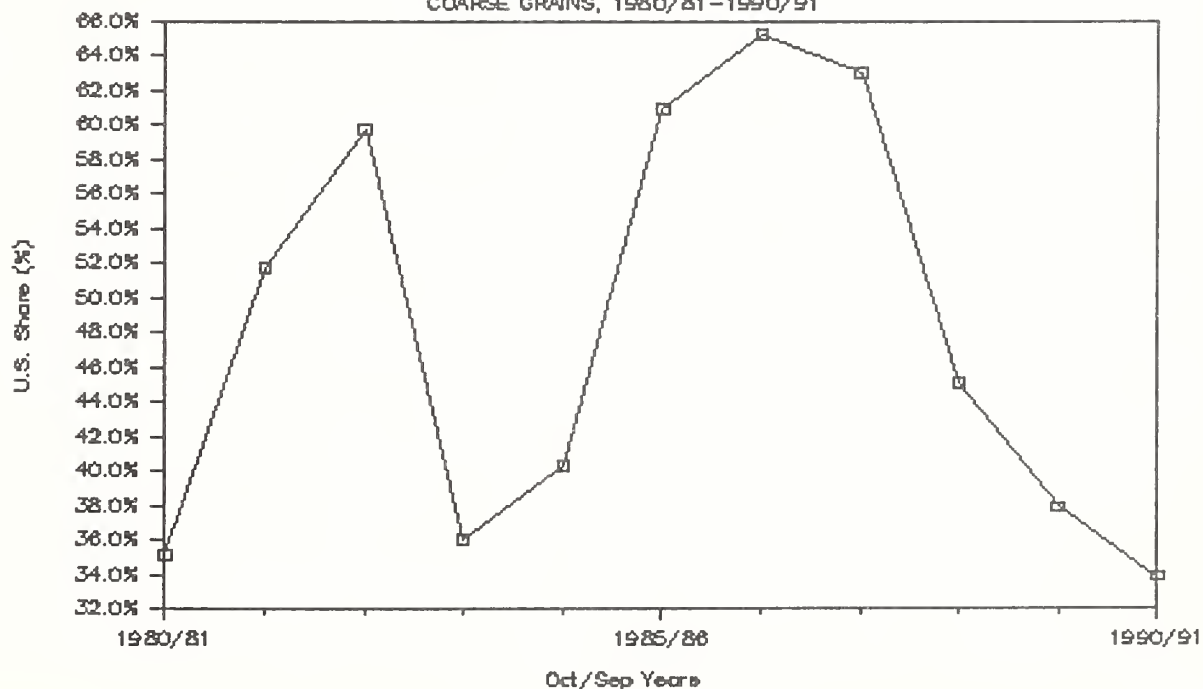


Chart 3

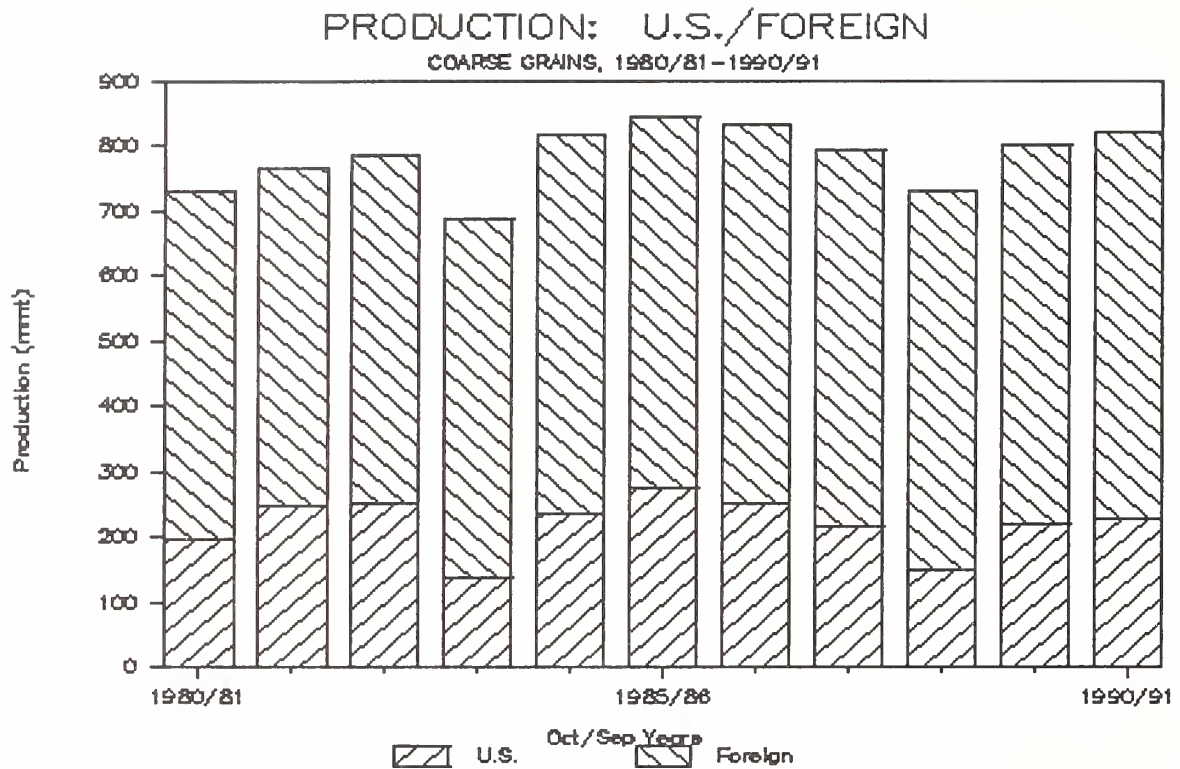


Chart 4

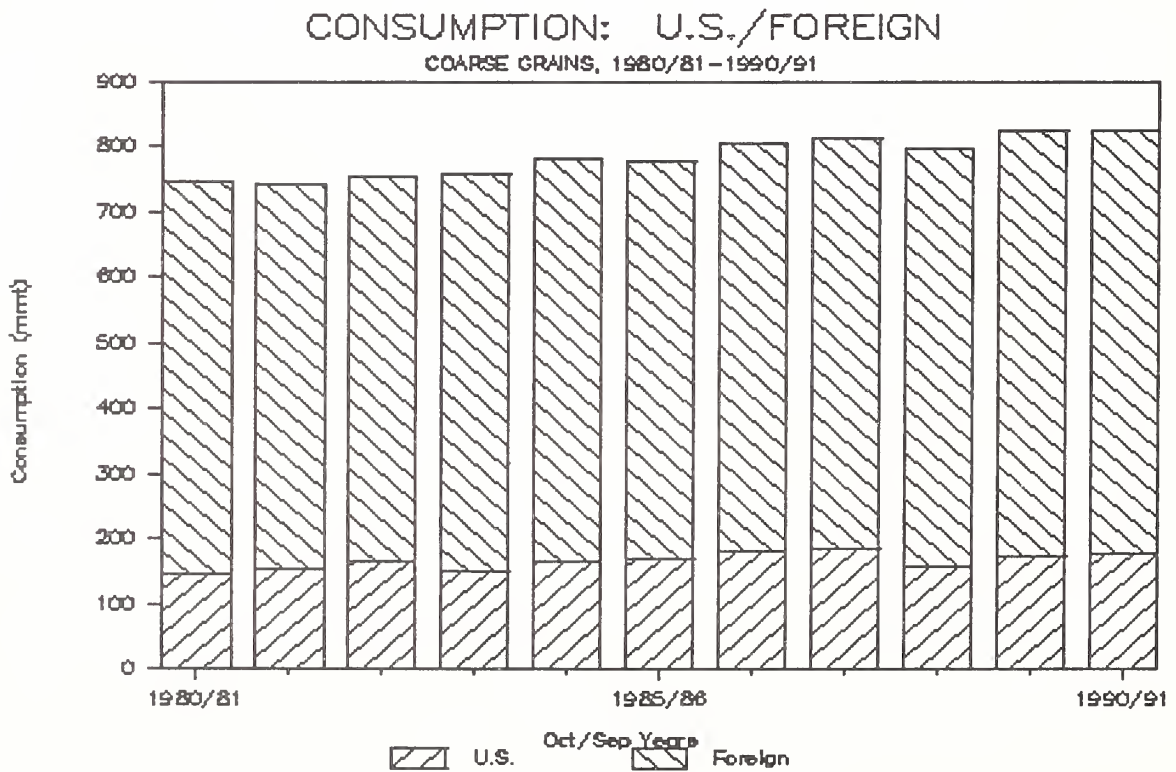




Chart 5

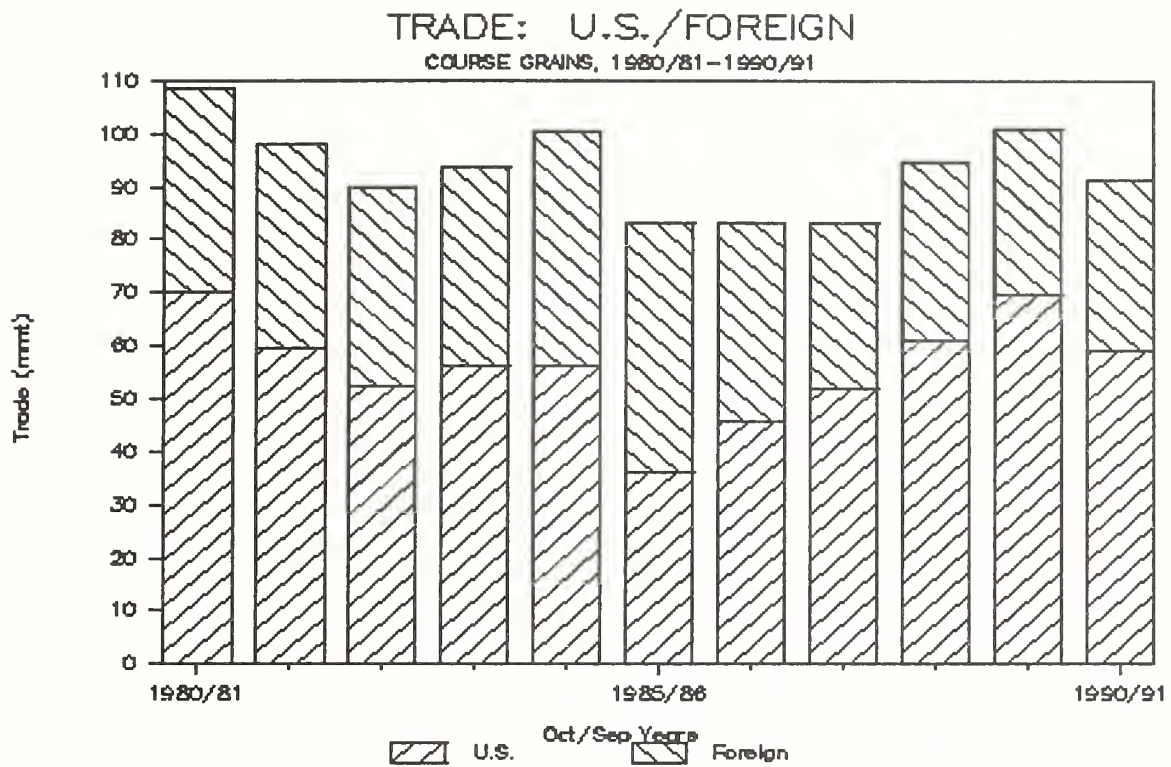
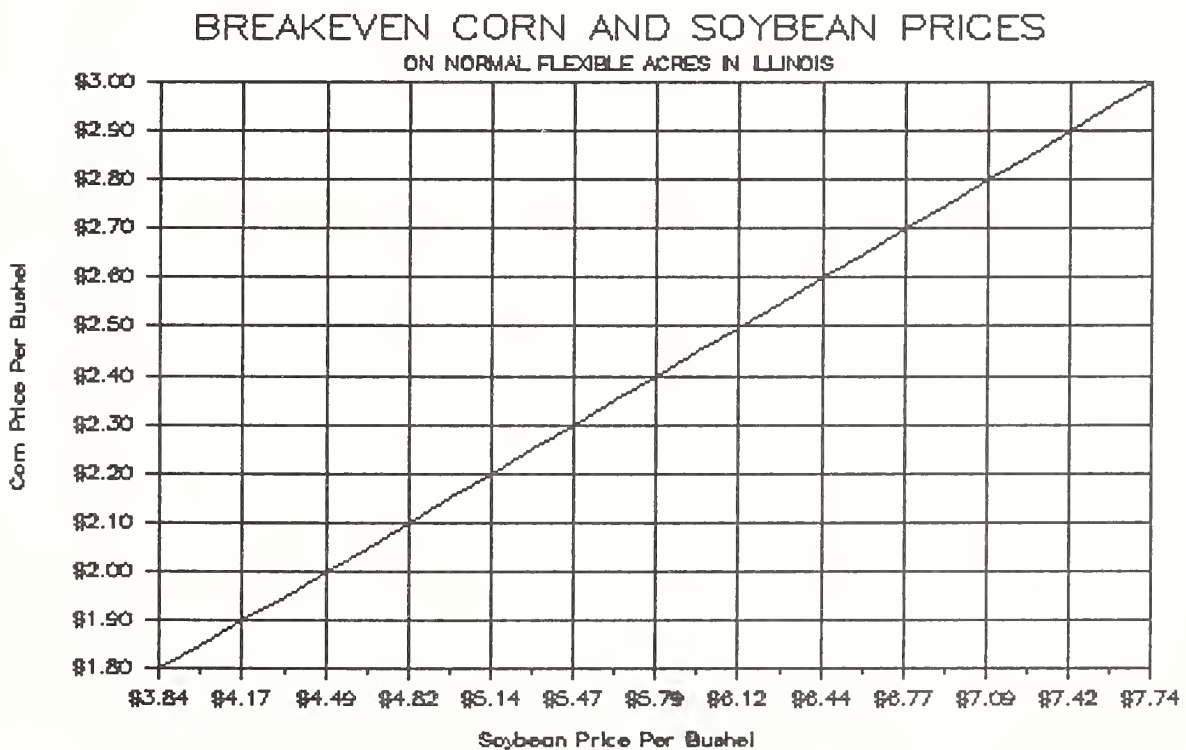


Chart 6



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
Washington, D.C. 20250-3900



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Outlook '91, Session C9      For Release:    Wednesday, November 28, 1990

## ENERGY PRODUCTION AND OTHER INDUSTRIAL FEED GRAIN USES

Jack Kintzle  
President, National Corn Growers Association

First of all, I want to tell you what a pleasure it is for me to be here and share the program today with such a distinguished group at the USDA's 67th annual Outlook Conference. Since the National Corn Growers Association has been very active in the area of commercialization for the past five or six years, I want to highlight those areas briefly today. Also, our efforts extend considerably beyond corn to all other crop and product areas, since they all help improve the profitability for U.S. farmers in total.

During the NCGA's early discussions of opportunities to industrialize and commercialize new agricultural commodities we discussed, on numerous occasions, what our feelings would be if the benefits did not accrue strictly to corn farmers. Our unanimous and unwavering conclusion was that if it was good for U.S. farmers and U.S. agriculture, then it was the right thing to do even if it was not corn specific. However, as you might imagine, we do focus almost all of our attention on corn. We trust that other organizations and individuals will look after their own commodities.

Following the completion of the report of the USDA's "New Farm and Forest Products Task Force" report, the National Corn Growers Association spent a great deal of time and energy working with other organizations, members of Congress, members of past and present administrations expressing our interest in and support of the conclusions of the Task Force. It was very encouraging to note that many political leaders and several in the executive branch picked up the flag for this cause and began to extoll its virtues in a number of ways.

Recently, we were most pleased to learn the final research title of the 1990 Farm Bill contains provisions (very similar to Task Force recommendations) for the establishment of a new structure

within the USDA to give continuity and long term direction to the entire process of commercializing new products and new crops in agriculture. This is something which is long over due and will serve our entire country as well as U.S. agriculture well into the year 2000 and beyond. Certainly we must all be increasingly concerned about our environment and our impact on it as well as the availability of raw energy for the production of materials which we all consume. Agriculture offers a great deal of hope in both of these areas.

When the National Corn Growers began to look at opportunities for new commercial/industrial products from corn, we were operating on the premise that you can make anything from a bushel of corn that you can make from a barrel of crude petroleum. We also felt U.S. farmers, although subject to the vagaries of weather, are perhaps a much more reliable and efficient long term supplier of raw energy through corn and other agricultural commodities than our on-again, off-again friends and allies in the Middle East.

When you see energy prices for raw crude petroleum double in a matter of a few weeks and when you begin to realize just how fragile the supply line or pipeline really is, then all of us begin to realize that we need to get serious about developing alternative energy sources. We believe the commodity corn can be used very efficiently to produce many of the commodities which are so vital to our economy. This can be done by storing the sun's energy in a bushel of corn and transforming it through carbohydrate chemistry into many everyday products which we all use.

A few examples of some of these commodities are ethanol, which is alcohol that can be used to extend our fuel supplies as well as reducing tailpipe emissions by 25% to 30%. We all know about the concerns that exist over polluted air in Denver and other large cities.

There is also a product called CMA (calcium magnesium acetate) which we think can be made very competitively from corn and used to de-ice our highways instead of highly corrosive salt which is destroying our expensive highways, bridges, automobiles, underground utilities, and also polluting the water we drink.

A process is also known to remove sulphur and other impurities from coal using ethanol. This process eliminates the need to put expensive scrubbers on smokestacks and eliminates the concerns over acid rain and other air pollution.

Many speciality chemicals can also be made using corn as a feedstock, replacing current petro-based chemicals.

Much development work has been done in these areas by companies such as Warner Lambert, Eastman Kodak, Archer Daniels Midland, A.E. Staley, and many others. We feel confident these new process and chemicals will be in the market soon.

A material made from the protein (the zein) in corn has been put back on the shelf to gather dust for the past 40 years because the patent rights were purchased by Gulf Oil Company in the early 1950's and promptly the product was withdrawn from the market. It may have been coincidental that during this same time synthetics such as rayon, orlon, and nylon were being introduced into the market place. Early research has been done indicating that this material has great potential for use in the making of many fibers including everything from a suit of clothes to the skin of a fighter jet to structural materials used in buildings.

A product developed in the mid 1970's known as hydrosorb or super slurper has great potential in many areas. It is a corn based starch that absorbs over 1000 times its own weight in moisture. It can be used to manage water conditions on arid land or in disposable babies' diapers.

One other final product I will mention is that of degradable plastics. This product was discovered over 40 years ago and only recently has come into the market place. The reason I mention this product last is because I want to explain to you, in the following few brief comments, the importance of the work of the National Corn Growers Association.

Over the past 50 years, there has been a great deal of research going on in the laboratories both public and private to identify new products or compounds made from agricultural commodities. Many of these products have never seen the light of day because 1) the economics weren't right at the time, 2) scientists by their nature, are not marketing oriented and may not have been able to fully visualize the marketing potential of a new discovery, 3) market place factors might have been such at the time that did not provide ready access for a new commodity, i.e., there may now be an environmental concern that did not exist when the product was discovered that allows this product now to have a new opportunity to succeed.

Many times a board of directors in a commercial company and its marketing staff will look at a new product in comparison with



one or more other new products which they are preparing to enter into the market place. Products which succeed in getting off of the laboratory work bench and into the market place are those which show the most immediate potential for earnings to the stock holders investment in the company. Our CEO Jeff Gain refers to this as the "brick wall" theory. Some things or products simply do not make it over the brick wall when they are first discovered.

The National Corn Growers Association has adopted a program to work with government, private industry and research institutions to try to uncover work that has been completed and long since forgotten or perhaps work that is underway to see if there are opportunities for products to enter the market place which may have been overlooked by previous or current inventors and marketers. In some cases, product opportunities may be tied to broad environmental issues and public policy concerns which the National Corn Growers can also address. Sometimes an organization such as the National Corn Growers can make valuable contributions to the educational or perhaps more importantly the learning curve of professional research, marketing and public policy people by simply providing for a dialogue between individuals and companies which are all interested in the same area, but may not be aware of each others work.

Also, it is important to look at economics these days in a new light. I think the best example of this is in the area of CMA. Currently, salt is used on our highways in the winter time and is selling for around 1 and 1/2 cents per pound. We have been told CMA can be made from \$2.50 per bushel corn for a cost of around 22 cents per pound. At first glance, you would think the cost differential between salt and CMA made from corn is prohibitive. However, if you consider the cost of salt in terms of damage it does to our infrastructure and our environment you can afford to pay from 44 cents per pound on the low side to 65 cents a pound on the high side and still be even with the cost of 1 and 1/2 cent salt. In other words, by the time you rebuild the bridges and highways, purify the water, replace the damage done to underground utilities, and the rust to your favorite automobile you could have spent a little more money to deice the highways and still been money ahead. It is like the old TV commercial: "pay me now or pay me later."

We, in the National Corn Growers Association, want to encourage the U.S. Department of Agriculture to seriously embrace the provisions of the 1990 Farm Bill which provides for the establishment of a new commercialization component. It is truly

an exciting opportunity and perhaps the most significant change in agricultural policy to occur in this country this century.

This new "concept" seems to have almost been designed for this conference which is so appropriately labled "Agricluture in a World of Change." We certainly agree and feel that corn will be a major player in those changes.

I would be very surprised if the industrial use category for corn were not at least 2 billion bushel larger in the year 2000 than it is today.

The concept that agricultural products are only to be used for food or in some cases fiber is truly out of date. As energy and environmental concerns come to focus and as agricultural competition and production around the world continues to expand it is even more important that we look for agriculture not only to solve some of these problems, but as a new economic resource base to provide stimulus for the future growth of agriculture and our entire economy. Agriculture is our country's greatest resource. If we manage it properly, it can continue to be the engine which runs this country successfully over the years ahead.

Thank you again for the opportunity to be with you today. I would be happy to respond to any questions.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91, Session C9      For Release: Wednesday, November 28, 1990

## GRAIN PROGRAMS IN THE 1990 FARM BILL

Bruce R. "Randy" Weber

Director, Commodity Analysis Division

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The aim of this paper is to outline the process that brought about the 1990 Farm Bill. The discussion will be general. Attachment 1 provides a more complete summary of the wheat and feed grain titles with a comparison of the 1985 Act to the 1990 Act.

### 1990 Farm Bill Beginnings

In July 1989, Secretary Yeutter began the trek toward the 1990 Farm Bill by testifying before the House Committee on Agriculture. Laying the framework for the debate Secretary Yeutter said

"we need to design legislation that will commit American agriculture to compete internationally in the coming years and decades. We have to make a national commitment to compete in a global market place and establish a political institutional framework that will facilitate that. This gets into the issue of "flexibility" as people have described it. I like the word "responsiveness" better. We have to be responsive to changing supply and demand conditions throughout the world and responsive to -- in particular to changes in marketing opportunities that emerge."

Thus began nearly 18 months of review, hearings, meetings, testimony and spirited debate on the 1990 Farm Bill.

### USDA Farm Bill Task Forces

In August 1989, USDA farm bill task forces were instituted to look at all aspects and issues pertaining to agricultural program matters. In the commodity area 17 subgroups were formed made up of program specialists representing ASCS, ERS, FAS and the Office of Budget and Program Analysis (OBPA). Their mission was to review each subject area and make recommendations to the

Under Secretary for International Affairs and Commodity Programs. Their recommendations formed the basis for the Administration's 1990 Farm Bill Proposals known as the "Green Book".

In addition to the many task force recommendations innumerable consultations were conducted with general farm organizations, commodity groups, consumer groups, agribusiness and industry representatives and the academic community to solicit their views and opinions on how the 1990 Farm Bill should be shaped. Also leading to the "Green Book" proposal was dialogue with Members of Congress and other Departments and Agencies of the Federal Government.

Fully aware of the pitfalls that previous Administration's have encountered by submitting farm bill proposals that were immediately rejected "out-of-hand" or were declared DOA (dead on arrival) by the Congress, the "Green Book" proposals were not presented as a legal document. The "Green Book" was comprehensive but easy to understand for those not familiar with agriculture policy. Unlike previous farm bill submissions from the Executive Branch, this document did serve as the framework for the 1990 Farm Bill debates.

#### The "Green Book" Proposals

In unveiling the "Green Book" proposal (February 1990) Secretary Yeutter made the following statement:

"A dynamic, rapidly changing decade lies before us; therefore, it is imperative that we in the Bush Administration join with the agricultural leadership of the Congress to develop a farm bill that is responsive to the agricultural needs of the 1990s. The first farm bill of this decade must provide the flexibility to adjust to change in the international marketplace, maintain the successful course set in the 1985 legislation, and balance the need for an abundant, safe and affordable food supply with conservation and improvement of our environment.

A great deal of work and thought has gone into these proposals. We hope they will carefully and promptly be considered by the Congress. Nearly every proposal builds on the foundation established the 1985 Farm Bill, a testimony to the wisdom of that Congressional act. Because that foundation is firmly established, we believe it is both feasible and desirable to have this new legislation signed into law before the fall planting season begins."



In concert with Secretary Yeutter, the general attitude surrounding the 1990 Farm Bill discussions was satisfaction with the thrust and accomplishments of the Food Security Act of 1985 (FSA).

The "Green Book" proposals were wide-ranging and covered a vast array of issues vital to America's farmers -- price and income supports, conservation and environment, international programs, crop disaster assistance, food and consumer services, farm credit, science and education, marketing and inspection services, and a host of miscellaneous provisions.

The hallmark of the "Green Book" proposal was planting flexibility. The issue of planting flexibility prevailed throughout the farm bill debate, however, the degree of flexibility and how it would be achieved varied considerably.

The "Green Book" proposal re-introduced the normal crop acreage (NCA) concept with a twist. The NCA would be made up of historical program crop and oilseed plantings with deficiency payments tied to the historical plantings of the program crop less reduced acreage. The original NCA program tied payments to current year plantings. Because the level of payment acreage was assured, producers could make planting decisions based on market signals rather than on Government payments. This proposal introduced "total planting flexibility". However, this approach was almost immediately coined "decoupling" but didn't prevail. Many groups did not favor the concept of receiving payments without having to plant the crop. However, the final version of the 1990 Farm Bill does contain flexibility provisions that provide similar planting incentives as the "Green Book" proposal, this will be discussed later.

Other significant "Green Book" proposals included a revamped farmer-owned reserve program, introduction of the target price concept for honey, wool and mohair; a reduction in the peanut quota support price; new conservation and environment initiatives; and the repeal of the FCIC legislation with the establishment of a standing disaster assistance program.

Following the unveiling of the "Green Book" proposals in February 1990, Congressional hearings were held to formalize the 1990 Farm Bill debate.

#### Congressional Farm Bill Action

Although numerous field hearings were conducted by both the House and Senate Agriculture Committees before February 1990, the process of formulating the structure of the 1990 Farm Bill began in the earnest after introduction of the "Green Book".

Despite farm income for 1988 and 1989 being at record or near record levels and farm debt greatly reduced -- opposite the environment under which the 1985 Farm Bill was enacted -- the underlying mood of the Agricultural Committees was to design a 1990 Farm Bill that embraced higher price support loans and indexed target prices.

Another key factor in the debate was the federal deficit and the need to bring the cost of entitlement programs down. Initially, both the House and Senate Agricultural Committees framed their farm bills with little regard for costs. Consequently, under the Senate Bill CCC outlays were estimated to be more than \$1.0 billion over the baseline while the House Bill exceeded the baseline by nearly \$2.0 billion. The mid-session review baseline for CCC outlays during fiscal years 1991-95 was estimated at \$54 billion.

The thrust of both the Senate bill and House bill with regard to commodity programs was similar. Major features included:

1. Target prices frozen at 1990 levels, except the Senate bill included escalating oats targets.
2. The House bill, mandated calculation of barley deficiency payments using only feed barley prices while the Senate Bill placed an upper limit on the differential between malt and feed barley prices.
3. The House bill, set wheat and feed grain loans at 85% of preceding 5-year olympic average with the "Findley" adjustment based on stock-to-use (S/U) ratios. The Senate bill retained the 1985 Act formula 75-85% of 5-year olympic average but mandated marketing loans and required an advance compensation to producers if the 1985 Act "Findley" adjustment was used.
4. Acreage Reduction Programs (ARP) set using the same S/U ratios but different ARP ranges.
5. Slightly different versions of the targeted option payments (TOP) program.
6. Both retained 0,50/92 programs but the Senate bill permitted minor oilseeds to be grown on 0/92 acreage without loss of deficiency payments.
7. Both contained flexible planting (base protection) provisions which permitted up to 25 percent of a base acreage to be planted to other crops with loss of deficiency payments.

The House and Senate each passed their version of the 1990 Farm Bill in July 1990 but still with estimated costs over the baseline.

By this time the budget issue has become the hot topic and both the House and Senate Agriculture Committee chairmen indicated a conference to work out the differences between the House and Senate bills would not take place until after the budget mark for agriculture was known. After a long and arduous process the budget agreement called for a \$13.6 billion reduction in fiscal year 1991-95 outlays for agriculture.

Then began the process of negotiation to resolve the differences between the House and Senate bills and to incorporate needed reconciliation changes to achieve the mandated \$13.6 billion reduction in agricultural outlays from the baseline. Since both the House and Senate bills exceeded baseline the ultimate cuts approached \$15 billion.

#### Conference Deliberations

During the latter half of September and the first half of October, House and Senate conferees and their staffs met with USDA officials to iron out differences and make changes in the 1990 Farm Bill to meet the budget agreement mark. After many hours of late night and early morning negotiations a 1990 Farm Bill was agreed to and approved by both Congressional Chambers on October 22, 1990 (Food, Agriculture, Conservation and Trade Act of 1990). The companion Omnibus Budget Reconciliation Act of 1990 was passed on October 26, 1990 and signed by the President shortly thereafter.

#### Food, Agriculture, Conservation and Trade Act of 1990 (FACT)

What has emerged from the 1990 Farm Bill process after nearly 18 months of deliberations is a bill that represents a compromise that tries to balance divergent and conflicting interests.

On balance, FACT continues the market-oriented approach to grains policy contained in the successful FSA moving forward in some areas and slipping back in some. It embodies many of the general objectives of the "Green Book" proposals. The FACT, in conjunction with the budget reconciliation legislation, has made agriculture a major contributor to reducing the Federal deficit. This will be a difficult burden for many of our farmers to bear, but the potential economic benefits to agriculture from reducing the deficit could substantially overshadow the reductions in Government spending for agriculture.

The provisions of FACT with changes brought about by the Reconciliation Act of 1990 will usher in a number of landmark changes in farm policy over the next 5 years. Some of the major changes will be:

1. Introduces a reduction in deficiency payment acreage (known as triple base). For each of the next 5 crop years the maximum payment acreage for wheat, feed grains, upland cotton and rice will be an acreage equal to 85% of the crop acreage base less the quantity of reduced acreage for each year.
2. Introduces a program where producers may plant up to 25% of their base acreage to other crops. This flexibility encompasses the 15% of base in item #1 above (to be known as "Normal Flex Acreage (NFA)") and an optional 10% (to be know as "Optional Flex Acreage (OFA)").
3. Mandates a minimum \$5.02 marketing loan for soybeans and for the first time mandates marketing loans for other oilseed crops, including sunflower seed, canola, rapeseed, safflower seed, mustard seed and flaxseed.
4. Increases loan rates for wheat and feed grains.
5. Restructures the farmer-owned reserve program to be more market-oriented by dropping release triggers, and introducing specific storage stop and interest start triggers.
6. Provides major revisions to U.S. foreign food assistance programs and includes provisions for implementing a number of the components of the President's Enterprise for the Americas Initiative for Latin American and Caribbean countries.
7. Makes several important improvements in the debt restructuring and inventory property authorities relating to FmHA loans.
8. Makes a number of changes designed to improve the actuarial soundness of the existing crop insurance programs.
9. Authorizes changes in the area of Rural Development.
10. Creates landmark changes in the area of conservation programs.



11. Makes changes in the areas of research, forestry, marketing and inspection, domestic food assistance and other miscellaneous programs.

#### Implementation of FACT - 1991 Crop

FACT provides a framework to guide U.S. farm policy for the 1991 thru 1995 crops. The bill contains many provisions that are clear and require no policy guidance but it also leaves many areas open for policy decisions. Most of the policy decisions are now under review and are expected to be made by mid-December.

Implementation of the commodity portion of the FACT is a major undertaking. Once policy decisions for the 1991 programs are made, handbooks must be written, regulations developed and software designed. This process is expected to take 4 months or longer. Consequently, a signup for the 1991 programs will not likely begin before March 1991.

An all out effort will be made to inform and educate the public as well as farmers about the 1991 farm programs. This program will be instituted as soon as possible after policy decisions have been finalized.

#### Outlook for FACT

The provisions of FACT place increased emphases on market signals. Also, key is the continued competitive loan rates and normal flex acres. These two provisions will combine to make surpluses and shortages more self-correcting than in the past. To maximize returns farmers now need to make choices. Unlike previous years, where the basic choice was to plant a program crop ensuring maximum payments, now producers can implement needed rotations for weed and disease control (without base loss) plant other crops where the market returns are higher; and begin managing their operation with less government interference.

The 1990s will be a new era for U.S. farmers. With the availability of Federal dollars shrinking the ability of farmers to attain or retain their profit margins will depend on choices they make. This will be a major challenge for both farmers and those who provide information.

COMPARISON OF WHEAT, FEED GRAIN AND COMMON PROVISIONS  
FOR THE 1985 AND 1990 FARM BILLS

Compiled by Jim Langley  
U.S. Department of Agriculture  
Agricultural Stabilization and Conservation Service

November 19, 1990

# COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments																										
WHEAT																													
1) Loan rate for wheat	<p>For 1986, minimum basic loan rate \$3.00/bu. For 1987-1990, minimum basic loan rate set at 75%-85% of 5-year moving average of price received by producers, dropping high and low, but the decline limited to following percent of preceding year:</p> <table><tr><td>1987</td><td>5%</td></tr><tr><td>1988</td><td>3%</td></tr><tr><td>1989</td><td>5% + 2% if necessary to maintain competitive position;</td></tr><tr><td>1990</td><td>5%.</td></tr></table> <p>If the average price received by producers in the preceding year was <math>\leq</math> 110% of loan rate, or if necessary to maintain competitive position, the Secretary shall reduce the 1986 loan rate by not less than 10%, and may reduce the 1987-1990 loan rates by an amount necessary to maintain competitiveness, but not by more than 20%.</p> <p><u>NOTE:</u> Loan rates for wheat under the 1985 Farm Bill were:</p> <table><tr><td>1986</td><td>\$2.40/bu.</td></tr><tr><td>1987</td><td>2.28</td></tr><tr><td>1988</td><td>2.21</td></tr><tr><td>1989</td><td>2.06</td></tr><tr><td>1990</td><td>1.95</td></tr></table>	1987	5%	1988	3%	1989	5% + 2% if necessary to maintain competitive position;	1990	5%.	1986	\$2.40/bu.	1987	2.28	1988	2.21	1989	2.06	1990	1.95	<p>Minimum basic loan rate set at 85% of 5-year moving average of price received by producers, dropping high and low, but decline limited to no more than 5%. "Findley" adjustment authorized based on current year S/U as follows.</p> <table><tr><td>Wheat Stocks/Use</td><td>"Findley" Adjustment</td></tr><tr><td><math>\geq 30\%</math></td><td>-10%</td></tr><tr><td><math>\geq 15\%</math> to <math>&lt; 30\%</math></td><td>- 5%</td></tr><tr><td><math>&lt; 15\%</math></td><td>0%</td></tr></table> <p>Notwithstanding the above S/U adjustment, minimum loan rate for wheat set at \$2.44 per bushel, unless such rate would exceed 80% of 5-year moving average market price determination.</p> <p>Notwithstanding the S/U adjustment authority, the Secretary may further reduce loan rates up to an additional 10 percent to maintain a competitive market position.</p> <p>If the Secretary adjusts loan rates in accordance with stocks/use estimates, he must submit a report to Congress documenting why the adjustment was necessary. The adjustment takes effect 60 days after submission of the report, except for 1991, in which it becomes effective on the date of the report.</p>	Wheat Stocks/Use	"Findley" Adjustment	$\geq 30\%$	-10%	$\geq 15\%$ to $< 30\%$	- 5%	$< 15\%$	0%	<p>The 1990 Farm Bill requires higher loan rates than under the 1985 Farm Bill, and ties the amount of the "Findley" adjustment to the estimated stocks/use ratio for the current year.</p> <p>Assuming maximum discretionary reduction, the effective loan rate is calculated as follows:</p> <p>[1] Calculate 5-year moving average, dropping high/low; [2] Determine maximum of 85% of [1] or 95% of previous year's basic loan rate. The result becomes this year's basic loan rate; [3] Reduce the basic loan rate by the appropriate "Findley" adjustment based on stocks/use; [4] Calculate 80% of 5-year moving average, dropping high/low; [5] Determine the results of the "80% test":     [a] If [4] <math>&gt;</math> 2.44, select maximum of 2.44 or [3];     [b] If [4] <math>\leq</math> 2.44, select [3]; [6] Calculate 90% of [5]. The result becomes this year's effective loan rate.</p>
1987	5%																												
1988	3%																												
1989	5% + 2% if necessary to maintain competitive position;																												
1990	5%.																												
1986	\$2.40/bu.																												
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1990	1.95																												
Wheat Stocks/Use	"Findley" Adjustment																												
$\geq 30\%$	-10%																												
$\geq 15\%$ to $< 30\%$	- 5%																												
$< 15\%$	0%																												

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
2) Deficiency payment rate for wheat	<p>The payment rate shall be the amount by which the target price exceeds the higher of (1) the national weighted average market price received by producers during the first 5 months of the marketing year, or (2) the loan rate for the crop prior to any adjustment for maintaining competitive position.</p> <p>If the national weighted average 5-month price exceeds \$2.55/bu. for 1986, \$2.65/bu. for 1987, or \$2.82 for 1988, at the option of the Secretary, the payment rate shall be the amount by which the target price exceeds these values or the loan rate.</p> <p>The Secretary may pay not more than 5 percent of the total amount of a payment in the form of wheat.</p>	<p>For the 1991-1993 crops: The payment rate shall be the amount by which the target price exceeds the higher of (1) the national weighted average market price received by producers during the first 5 months of the marketing year, or (2) the loan rate for the crop prior to any adjustment for stocks/use or for maintaining competitive position.</p> <p>For the 1994-1995 crops: The payment rate shall be the amount by which the target price exceeds the higher of (1) the lesser of (a) the national weighted average market price received by producers during the marketing year; or, (b) the national weighted average market price received by producers during the first 5-months of the marketing year plus 10 cents; or, (2) the loan rate for the crop prior to any adjustment for stocks/use or for maintaining competitive position.</p>	<p>The method of calculating deficiency payments are similar in the 1985 and 1990 Farm Bills for the 1991-1993 crops. The 1990 Farm Bill uses the lesser of the 12-month price or 5-month price plus 10 cents in calculating deficiency payments for 1994 and 1995.</p>
3) Emergency compensation payments	<p>If the Secretary adjusts loan rates to maintain competitive position, the Secretary shall provide emergency compensation by increasing the deficiency payments by an amount necessary to provide producers the same total return as if loan rates had not been adjusted. The December 1 estimate of the national weighted average market price received by producers during the marketing year shall be used to calculate the emergency compensation payment rate. At least 75 percent of the increase in payments shall be paid by December 15.</p>	<p>Same as 1985 Farm Bill.</p>	



## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
4) Target price for wheat	<p>The target price for wheat shall not be less than \$4.38/bu. for 1986 and 1987, \$4.23 for 1988, \$4.10 for 1989, and \$4.00 for 1990.</p> <p>At the option of the Secretary, the target price may be determined on the basis of: (1) the ARP percentage; or, (2) a graduated scale of production, with such payments targeted to commercial family farms with gross sales in excess of \$20,000.</p>	<p>The target price for wheat shall not be less than \$4.00/bu. for each of the 1991-1995 crops.</p>	<p>The 1990 Farm Bill freezes target prices at the 1990.</p>

# COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments																
5) Acreage reduction programs for wheat	<p>ARPs determined on basis of estimated carryover stocks:</p> <p><u>If carryover:</u> ARP will be:</p> <p><u>1986:</u> &gt; 1 bil. bu. <math>\geq 15 \leq 22.5\%</math> w/ 2.5% PLD <math>\leq 1</math> bil. bu. <math>\leq 15\%</math> w/ a PLD</p> <p><u>1987:</u> &gt; 1 bil. bu. <math>\geq 20 \leq 27.5\%</math> <math>\leq 1</math> bil. bu. <math>\leq 20\%</math></p> <p><u>1988-90:</u> &gt; 1 bil. bu. <math>\geq 20 \leq 30\%</math> <math>\leq 1</math> bil. bu. <math>\leq 20\%</math></p> <p>If a wheat acreage limitation program is announced, such limitation shall be achieved by applying a uniform percentage reduction to the crop acreage base for each wheat-producing farm.</p>	<p><u>1991 crop:</u> ARP not less than 15%.</p> <p>1992-1995 crops: ARP level based on stocks/use ratio for preceding marketing year, subject to specified minimum ARPs:</p> <table><tr><td>Stocks/Use</td><td>ARP</td></tr><tr><td><math>&gt; 40\%</math></td><td>10 - 20%</td></tr><tr><td><math>\leq 40\%</math></td><td>0 - 15%</td></tr></table> <p><u>Minimum ARP levels for 1992-1995:</u></p> <table><tr><td colspan="2">Not less than:</td></tr><tr><td>1992</td><td>6%</td></tr><tr><td>1993</td><td>5%</td></tr><tr><td>1994</td><td>7%</td></tr><tr><td>1995</td><td>5%</td></tr></table> <p>Minimum ARPs shall not apply to a crop of wheat if the estimated stocks/use ratio is less than 34%; or, the minimum ARPs shall not apply to any of the 1992-1995 crops of wheat if the beginning stocks of soybeans for 1991 will be less than 325 million bushels.</p> <p>Except for the Targeted Option Program, if a wheat acreage limitation program is announced, such limitation shall be achieved by applying a uniform percentage reduction (from 0 to 20%) to the crop acreage base for each wheat-producing farm.</p>	Stocks/Use	ARP	$> 40\%$	10 - 20%	$\leq 40\%$	0 - 15%	Not less than:		1992	6%	1993	5%	1994	7%	1995	5%	<p>The 1990 Farm Bill determines ARPs on the basis of stocks/use ratios instead of quantity of carryover stocks. The 1990 Farm Bill also mandates a lower maximum ARP and allows for a 0 ARP.</p>
Stocks/Use	ARP																		
$> 40\%$	10 - 20%																		
$\leq 40\%$	0 - 15%																		
Not less than:																			
1992	6%																		
1993	5%																		
1994	7%																		
1995	5%																		

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
6) Special provision for wheat planted in 1990	No such provision.	<p>A producer participating in the program for the 1991 crop of winter wheat may elect one of the following modifications:</p> <p>(1) The producer's deficiency payments may be calculated as the difference between the target price and the higher of: (a) the lesser of the national weighted average market price received by producers for the marketing year or for the first 5 months of the marketing year; or, (b) The loan rate prior to any adjustment for stocks/use or competitive position.</p> <p>(2) The producer's payment acreage shall be the lesser of (a) the number of acres planted to the crop for harvest within the permitted acreage; or, (b) 85 percent of the crop acreage base for the crop for the farm less the quantity of reduced acreage.</p>	The 1990 Farm Bill allows producers of the 1991 crop of winter wheat a choice of calculating deficiency payments based on a 12-month price, or "triple base."

# COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments																																														
FEED GRAINS																																																	
7) Loan rate for feed grains	<p>For 1986, minimum corn basic loan rate \$2.40/bu. For 1987-1990, minimum basic loan rate set at 75%-85% of 5-year moving average of price received by producers, dropping high and low, but the decline limited to following percent of preceding year:</p> <table><tr><td>1987</td><td>5%</td></tr><tr><td>1988</td><td>3%</td></tr><tr><td>1989</td><td>5% + 2% if necessary to maintain competitive position;</td></tr><tr><td>1990</td><td>5%.</td></tr></table> <p>If the average price received by producers in the preceding year was <math>\leq</math> 110% of loan rate, or if necessary to maintain competitive position, the Secretary shall reduce the 1986 loan rate by not less than 10%, and may reduce the 1987-1990 loan rates by an amount necessary to maintain competitiveness, but not by more than 20%.</p> <p><u>NOTE:</u> Loan rates for feed grains under the 1985 Farm Bill were (\$/bu):</p> <table><tr><th></th><th>CRN</th><th>SRG</th><th>BRL</th><th>OTS</th></tr><tr><td>1986</td><td>1.92</td><td>1.82</td><td>1.56</td><td>0.99</td></tr><tr><td>1987</td><td>1.82</td><td>1.74</td><td>1.49</td><td>0.94</td></tr><tr><td>1988</td><td>1.77</td><td>1.68</td><td>1.44</td><td>0.90</td></tr><tr><td>1989</td><td>1.65</td><td>1.57</td><td>1.34</td><td>0.85</td></tr><tr><td>1990</td><td>1.57</td><td>1.49</td><td>1.28</td><td>0.81</td></tr></table>	1987	5%	1988	3%	1989	5% + 2% if necessary to maintain competitive position;	1990	5%.		CRN	SRG	BRL	OTS	1986	1.92	1.82	1.56	0.99	1987	1.82	1.74	1.49	0.94	1988	1.77	1.68	1.44	0.90	1989	1.65	1.57	1.34	0.85	1990	1.57	1.49	1.28	0.81	<p>Minimum corn basic loan rate set at 85% of 5-year moving average of price received by producers, dropping high and low, but decline limited to no more than 5%.</p> <p>"Findley" adjustment authorized based on current year S/U as follows.</p> <table><tr><th>Corn Stocks/Use</th><th>"Findley" Adjustment</th></tr><tr><td><math>&gt;25\%</math></td><td>-10%</td></tr><tr><td><math>\geq 12.5 &lt; 25\%</math></td><td>- 5%</td></tr><tr><td><math>&lt;12.5\%</math></td><td>0%</td></tr></table> <p>Notwithstanding the above S/U adjustment, minimum loan rate for corn set at \$1.76 per bushel, unless such rate would exceed 80% of 5-year moving average market price determination.</p> <p>Notwithstanding the S/U adjustment authority, the Secretary may further reduce loan rates up to an additional 10 percent to maintain a competitive market position.</p> <p>If the Secretary adjusts loan rates in accordance with stocks/use estimates, he must submit a report to Congress documenting why the adjustment was necessary. The adjustment takes effect 60 days after submission of the report, except for 1991, in which it becomes effective on the date of the report.</p>	Corn Stocks/Use	"Findley" Adjustment	$>25\%$	-10%	$\geq 12.5 < 25\%$	- 5%	$<12.5\%$	0%	<p>The 1990 Farm Bill requires higher loan rates than under the 1985 Farm Bill, and ties the amount of the "findley" adjustment to estimated stocks/use ratio for the current year.</p> <p>The barley program has been discretionary under the 1985 Farm Bill, but is mandatory under the 1990 Farm Bill.</p> <p>Assuming maximum discretionary reduction, the effective loan rate is calculated as follows:</p> <p>[1] Calculate 5-year moving average, dropping high/low; [2] Determine maximum of 85% of [1] or 95% of previous year's basic loan rate. The result becomes this year's basic loan rate; [3] Reduce the basic loan rate by the appropriate "findley" adjustment based on stocks/use; [4] Calculate 80% of 5-year moving average, dropping high/low; [5] Determine the results of the "80% test": [a] If [4] <math>&gt;</math> 1.76, select maximum of 1.76 or [3]; [b] If [4] <math>\leq</math> 1.76, select [3]; [6] Calculate 90% of [5]. The result becomes this year's effective loan rate.</p>
1987	5%																																																
1988	3%																																																
1989	5% + 2% if necessary to maintain competitive position;																																																
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# COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
8) Loan rates for other feed grains	<p>The Secretary shall make available to producers loans and purchases of grain sorghums, barley, oats, and rye, at such level as the Secretary determines is fair and reasonable in relation to corn, taking into consideration the feeding value of the commodity in relation to corn.</p>	<p>Same as 1985 Farm Bill.</p>	
9) Deficiency payment rate for corn, grain sorghums, oats, and barley	<p>The payment rate shall be the amount by which the target price exceeds the higher of (1) the national weighted average market price received by producers during the first 5 months of the marketing year, or (2) the loan rate for the crop prior to any adjustment for maintaining competitive position.</p> <p>If the national weighted average 5-month price of corn exceeds \$2.04/bu. for 1986, \$2.19/bu. for 1987, or \$2.24 for 1988, at the option of the Secretary, the payment rate shall be the amount by which the target price exceeds these values or the loan rate.</p> <p>The payment rate for grain sorghums, oats, and, if designated by the Secretary, barley, shall be fair and reasonable in relation to corn.</p> <p>The Secretary may pay not more than 5 percent of the total amount of a payment in the form of feed grains.</p>	<p>For the 1991-1993 crops: The payment rate shall be the amount by which the target price exceeds the higher of (1) the national weighted average market price received by producers during the first 5 months of the marketing year, or (2) the loan rate for the crop prior to any adjustment for stocks/use or for maintaining competitive position.</p> <p>For the 1994-1995 crops: The payment rate shall be the amount by which the target price exceeds the higher of (1) the lesser of (a) the national weighted average market price received by producers during the marketing year; or, (b) the national weighted average market price received by producers during the first 5-months of the marketing year plus 7 cents; or, (2) the loan rate for the crop prior to any adjustment for stocks/use or for maintaining competitive position.</p> <p>With regard to the payment rate for barley, the Secretary shall use the national weighted average market price received by producers of feed barley.</p>	<p>The method of calculating deficiency payments are similar in the 1985 and 1990 Farm Bills for the 1991-1993 crops. The 1990 Farm Bill uses the lesser of the 12-month price or 5-month price plus 7 cents in calculating deficiency payments for 1994 and 1995.</p>

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments										
10) Emergency compensation payments	<p>If the Secretary adjusts loan rates to maintain competitive position, the Secretary shall provide emergency compensation by increasing the deficiency payments by an amount necessary to provide producers the same total return as if loan rates had not been adjusted. The national weighted average market price received by producers during the marketing year shall be used to calculate the emergency compensation payment rate.</p>	<p>If the Secretary adjusts loan rates for stocks/use or competitive position, the Secretary shall provide emergency compensation by increasing the deficiency payments by an amount necessary to provide producers the same total return as if loan rates had not been adjusted. The national weighted average market price received by producers during the marketing year shall be used to calculate the emergency compensation payment rate.</p>											
11) Target prices for feed grains	<p>The target price for corn shall not be less than \$3.03 for each of the 1986 and 1987 crops, \$2.93 for 1988, \$2.84 for 1989, and \$2.75 for 1990.</p> <p>Target prices for other feed grains set at a level fair and reasonable in relative to corn.</p>	<p>The minimum target price for feed grains for each of the 1991-1995 crop years shall be:</p> <table><tr><td>Corn</td><td>\$2.75/bu,</td></tr><tr><td>Oats</td><td>1.45</td></tr><tr><td>Grain</td><td></td></tr><tr><td>    Sorghums</td><td>2.61</td></tr><tr><td>    Barley</td><td>A value fair and reasonable relative to corn, but not less than 85.8 percent of the corn target price.</td></tr></table>	Corn	\$2.75/bu,	Oats	1.45	Grain		Sorghums	2.61	Barley	A value fair and reasonable relative to corn, but not less than 85.8 percent of the corn target price.	<p>The 1990 Farm Bill freezes target prices at the 1990 level.</p>
Corn	\$2.75/bu,												
Oats	1.45												
Grain													
Sorghums	2.61												
Barley	A value fair and reasonable relative to corn, but not less than 85.8 percent of the corn target price.												

# COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments						
12) Acreage reduction programs for feed grains	<p>ARPs determined on basis of estimated carryover stocks:</p> <p>If carryover: ARP will be:</p> <p>1986: &gt; 2 bil. bu. <math>\geq 12.5 \leq 17.5</math> w/ 2.5% PLD <math>\leq 2</math> bil. bu. <math>\leq 12.5</math> w/ a PLD</p> <p>1987-89: &gt; 2 bil. bu. <math>\geq 12.5 \leq 20\%</math> <math>\leq 2</math> bil. bu. <math>\leq 12.5\%</math></p> <p>1990: &gt; 2 bil. bu. <math>\geq 12.5 \leq 20\%</math> <math>\leq 2 &gt; 1.8</math> bil. bu. <math>\geq 10\% \leq 12.5\%</math> <math>\leq 1.8</math> bil. bu. <math>\leq 10\%</math></p> <p>If a feed grain acreage limitation is announced, such limitation shall be achieved by applying a uniform percentage reduction to the feed grain crop acreage base for each feed grain-producing farm.</p> <p>In the case of the 1988-1990 crops of oats, the Secretary shall not establish an ARP greater than 5 percent. In the case of the 1990 crop of oats, the Secretary may establish an ARP less than 5 percent. If no ARP is established for 1990, the Secretary shall ensure that the crop acreage bases and farm acreage bases established for the farm are not increased.</p>	<p>1991 crop: Corn ARP not less than 7.5% nor greater than 20%. Grain sorghum and barley ARP set independent of corn based on respective supply/demand conditions (from 0% to 20%).</p> <p>1992-1995 crops: ARP level based on stocks/use ratio for preceding marketing year:</p> <table><tr><td>Stocks/Use</td><td>ARP</td></tr><tr><td>&gt;25%</td><td>10 - 20%</td></tr><tr><td><math>\leq 25\%</math></td><td>0 - 12.5%</td></tr></table> <p>These ARPs are subject to a minimum of 7.5% for each of the 1992-1995 crops of corn, grain sorghum, and barley.</p> <p>Minimum ARPs shall not apply to a crop of corn, grain sorghum, and barley, if the estimated stocks/use ratio is less than 20%; or, the minimum ARPs shall not apply to any of the 1992-1995 crops of feed grains if the beginning stocks of soybeans for 1991 will less than 325 million bushels.</p> <p>1991-1995 crops of oats: ARP level shall be 0%.</p> <p>Except for the Targeted Option Program, if a feed grain acreage limitation program is announced, such limitation shall be achieved by applying a uniform percentage reduction (from 0 to 20%) to the crop acreage base for corn, grain sorghum, barley, or oats, respectively, for each feed grain-producing farm.</p>	Stocks/Use	ARP	>25%	10 - 20%	$\leq 25\%$	0 - 12.5%	<p>The 1990 Farm Bill determines ARPs on the basis of stocks/use ratios instead of quantity of carryover stocks. The 1990 Farm Bill also allows for a 0 ARP for all feed grains and mandates a 0 ARP for oats. ARPs for grain sorghums and barley may be set mutually exclusive of corn. Corn and sorghum bases are no longer combined.</p>
Stocks/Use	ARP								
>25%	10 - 20%								
$\leq 25\%$	0 - 12.5%								

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
13) Exception for malting barley	The Secretary may provide that no producer of malting barley shall be required as a condition of eligibility for feed grain program benefits to comply with any acreage limitation if the producer has previously produced a malting variety of barley, plants only an acceptable malting barley variety, and meets other conditions prescribed by the Secretary.	Same as 1985 Farm Bill.	
14) Malting barley	No such provision.	The Secretary shall provide for an assessment for each of the 1991-1995 crop years to be levied on producers of malting barley that are participating in the production adjustment program. The assessment shall not exceed 5 percent of the value of malting barley produced on the farm.	The 1990 Farm Bill requires an assessment on producers of malting barley who participate in production adjustment programs.
15) Price support for high moisture feed grains		Effective for each of the 1991-1995 crops of feed grains, the Secretary shall make available <u>recourse loans</u> to producers who: normally harvest all or a portion of their feed grains in a high moisture state; present certified evidence of the quantity of feed grains so harvested; certify that they were owners of the feed grain; comply with deadlines; and participate in an acreage limitation program. Loans will be made on a quantity of the crop determined by multiplying (1) the acreage of the feed grain in a high moisture state harvested; by (2) the lower of the farm program payment yield or the actual yield on a similar field from which the high moisture feed grain was obtained.	The 1990 Farm Bill offers <u>recourse loans</u> to producers who harvest high moisture feed grains.



## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
16) Price support for corn silage	The Secretary may make loans and purchases available to producers who cut corn for silage and purchase or exchange corn that has been produced in such crop year by another producer; and who participate in the announced acreage limitation program. Such loans may be made on the quantity equal to the acreage of corn for silage multiplied by the lower of the farm program payment yield or the actual yield on the farm that is similar to the field of silage.	Same as 1985 Farm Bill.	
<b>GENERAL COMMODITY PROVISIONS FOR WHEAT AND FEED GRAINS</b>			
17) Maximum payment acres for wheat and feed grains	Payment acres for the crop shall be the lesser of (1) the number of acres planted to the crop for harvest within the permitted acreage; or, (2) the permitted acreage (100 percent of the crop acreage base less the quantity of reduced acreage).	Payment acres for the crop shall be the lesser of (1) the number of acres planted to the crop for harvest within the permitted acreage; or, (2) 85 percent of the crop acreage base less the quantity of reduced acreage.	The 1990 Budget Reconciliation Act reduces the potential payment acreage by 15 percent of the crop acreage base.

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
18) 0/92 program for wheat and feed grains	<p>If an acreage limitation program is in effect and producers devote more than 8 percent of their permitted acres to conserving uses, the portion of permitted acreage in excess of 8 percent devoted to conserving uses shall be considered planted to wheat and feed grains for purposes of determining the individual farm program acreage, and producers shall be eligible for deficiency payments with respect to such acreage at a per-bushel payment rate not less than the projected deficiency payment rate announced prior to program sign-up. A producer's crop acreage base or program payment yield cannot be adversely affected by participation in the 0/92 program.</p> <p>The Secretary may limit acreage entered into 0/92 to minimize adverse effects on agribusiness and other agriculturally related economic interests within any county, State, or region. No acreage restrictions may be imposed on producers in a county who are eligible for disaster emergency loans.</p>	<p>Same as 1985 Farm Bill, except the 8% required conserving use is calculated off the maximum payment acreage rather than the permitted acreage.</p>	<p>The 1990 Farm Bill continues the 0/92 program and makes the 0/92 provision subject to the 15 percent reduction in payment acreage provision in the 1990 Budget Reconciliation Act.</p>

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
19) Alternative crops on wheat and feed grains conserving use acreage	<p>The Secretary may permit all or any portion of acreage required to be devoted to conserving uses to be devoted to sweet sorghum, guar, sesame, safflower, sunflower, castor beans, mustard seed, crambe, plantago ovato, flaxseed, triticale, rye, commodities for which no substantial domestic production or market exists but that could yield industrial raw materials being imported, or commodities grown for experimental purposes (including kenaf). The Secretary may permit production of these crops only if the production is not likely to increase the cost of the price support program and will not adversely affect farm income; and, the production is needed to provide an adequate supply of the commodity or is needed to encourage increased industrial use of the raw material.</p>	<p><u>Industrial and other crops:</u> The Secretary may permit all or any portion of acreage required to be devoted to conserving uses to be devoted to sweet sorghum, guar, sesame, castor beans, crambe, plantago ovato, triticale, rye, mung beans, commodities for which no substantial domestic production or market exists but that could yield industrial raw materials being imported, or commodities grown for experimental purposes (including kenaf and milkweed). The Secretary may permit production of these crops only if the production is not likely to increase the cost of the price support program and will not adversely affect farm income; and, the production is needed to provide an adequate supply of the commodity or is needed to encourage increased industrial use of the raw material.</p> <p><u>Oilseeds:</u> The Secretary shall permit all or any part of conserving use acreage qualifying for payment to be devoted to sunflowers, rapeseed, canola, safflower, flaxseed, mustard seed, and other minor oilseeds designated by the Secretary. The producer has the option of receiving deficiency payments and forgoing loan eligibility for all of that crop on the farm, or forgoing deficiency payments, but keeping loan eligibility.</p>	<p>The 1990 Farm Bill removes the Secretary's discretion in allowing minor oilseeds on conserving use acreage.</p> <p>Producers have a choice of receiving either deficiency payments under 0/92 or marketing loan benefits for the minor oilseeds planted on conserving use acres.</p>

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
20) Acreage devoted to conservation uses	A number of acres on the farm, determined by dividing (1) the product obtained by multiplying the number of acres required to be withdrawn from the production of wheat and feed grains times the number of acres planted to wheat and feed grains; by (2) the number of acres authorized to be planted to wheat and feed grains under the limitation established by the Secretary. The number of acres so determined is referred to as "reduced acres."	A number of acres on the farm, determined by multiplying the wheat and feed grains crop acreage base by the percentage reduction required by the Secretary, shall be devoted to conservation uses. The number of acres so determined is referred to as "reduced acres." The remaining acreage is referred to as "permitted acreage."	The 1990 Farm Bill simplifies the calculation of reduced acres.
21) Planting designated crops on reduced acreage	No such provision.	<p>The Secretary may permit producers to plant a designated crop on no more than one-half of the reduced acreage on the farm, with loss in deficiency payments on a number of acres determined by the Secretary that will assure no additional cost to CCC. If the producer participates in more than one program crop on the farm, payments will be reduced on a prorata basis.</p> <p>Designated crops are defined as: any oilseed; any industrial or experimental crops designated by the Secretary; any other crop, except program crops and fruit or vegetable crops (including potatoes and dry edible beans) not designated by the Secretary as an industrial or experimental crop, or a crop for which no substantial domestic production or market exists. The Secretary may prohibit the planting of any of the above crops.</p>	The 1990 Farm Bill, subject to Secretarial discretion, allows designated crops to be planted on reduced acres if producers forgo deficiency payments on a number of acres determined by the Secretary.



# COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments															
22) Targeted option payments for wheat and feed grains	No such provision.	<p>If the Secretary implements an acreage limitation program, the Secretary may permit producers who do not receive 0/92 payments for wheat and feed grains to adjust their ARP requirement in the following manner:</p> <p><u>Increased acreage limitation option:</u> If offered, producers have the option to increase their ARP above the announced ARP percentage by:</p> <table><tr><td></td><td>Up to</td><td>Max</td></tr><tr><td></td><td>% points</td><td>ARP %</td></tr><tr><td></td><td><u>WHT</u> <u>CRN</u></td><td><u>WHT</u> <u>CRN</u></td></tr><tr><td>1991</td><td>10 5</td><td>25 20</td></tr><tr><td>1992-95</td><td>15 10</td><td>25 20</td></tr></table> <p>Secretary must <u>increase the target price</u> by not less than 0.5 nor more than 1.0 percent for each 1-percentage point increase in the ARP.</p> <p><u>Decreased acreage limitation option:</u> If offered, producers may, decrease their ARP, but not by more than one-half of the announced ARP. The Secretary must decrease the target price, by not less than 0.5% nor more than 1.0% for each 1-percentage point decrease in the ARP.</p> <p>The Secretary shall, to the extent practicable, ensure that the targeted option program is offered in a manner that does not have a significant effect on program participation, total production, or does not result in additional budget outlays.</p>		Up to	Max		% points	ARP %		<u>WHT</u> <u>CRN</u>	<u>WHT</u> <u>CRN</u>	1991	10 5	25 20	1992-95	15 10	25 20	The 1990 Farm Bill adds the targeted option program, subject to Secretarial discretion.
	Up to	Max																
	% points	ARP %																
	<u>WHT</u> <u>CRN</u>	<u>WHT</u> <u>CRN</u>																
1991	10 5	25 20																
1992-95	15 10	25 20																

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
23) Annual or perennial cover on conservation use acres	<p>Acreage required to be devoted to conservation uses must be protected from weeds and wind and water erosion.</p>	<p>Acreage required to be devoted to conservation uses must be protected from weeds and wind and water erosion.</p> <p>A participating producer is required to plant an annual or perennial cover on at least 50 percent of the acreage removed from production, not to exceed 5 percent of the crop acreage base. If the producer elects to establish a perennial cover, CCC shall make cost share assistance available for 25 percent of the approved cost of establishing the cover on not more than 50 percent of the acreage diverted from production, not to exceed 5 percent of the crop acreage base. The producer shall agree to maintain the perennial cover for a minimum of 3 years. This requirement shall not apply to designated arid areas (including summer fallow areas).</p>	<p>The 1990 Farm Bill requires annual or perennial cover on at least 50 percent of reduced acreage, not to exceed 5 percent on base.</p>
24) Conserving crops on reduced acres	<p>The Secretary may permit all or any portion of reduced acreage on a farm to be devoted to sweet sorghum, guar, sesame, safflower, sunflower, castor beans, mustard seed, crambe, plantago ovato, flaxseed, triticale, rye, or other commodities, if the Secretary determines that production of these crops is not likely to increase the cost of the price support program, will not adversely affect farm income, and the production is needed to provide an adequate supply of the commodities.</p>	<p>Same as 1985 Farm Bill, except deletes safflower, mustard seed, sunflower, and flaxseed; and, adds mung beans and milkweed.</p>	

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
25) Haying and grazing	<p>Haying and grazing shall be permitted on reduced acreage, conserving use acreage, and on acreage diverted under an annual land diversion programs, except during any consecutive 5-month period between April 1 and October 31 that is established by the State committee. The Secretary may permit unlimited haying and grazing in the case of natural disasters. Haying and grazing shall not be permitted for any crop if the Secretary determines that haying and grazing would have an adverse economic effect.</p>	<p>Haying and grazing shall be permitted on reduced acreage, conserving use acreage, and on acreage diverted under a annual land diversion programs, except during any consecutive 5-month period between April 1 and October 31 that is established by the State committee. The Secretary may permit unlimited haying and grazing in the case of natural disasters. The Secretary may not exclude irrigated or irrigable acreage not planted in alfalfa when exercising this authority.</p>	<p>The 1990 Farm Bill removes the provision whereby the Secretary may prohibit haying and grazing if it would create an adverse economic hardship, and prohibits the Secretary from excluding irrigated or irrigable acreage not planted in alfalfa when exercising the authority to permit unlimited haying and grazing in the case of natural disasters.</p>
26) Water storage uses	<p>No such provision.</p>	<p>Regulations issued by the Secretary shall provide that land converted to water storage areas shall be considered to be devoted to conservation uses if the land was planted to program crops or oilseeds in at least 3 out of the last 5 years. Such land is eligible for up to 5 years if it remains in water storage, is not devoted to commercial uses (including commercial fish production), is not ground water, and the farm was irrigated with ground water during at least 1 of the last 5 years.</p>	
27) Summer fallow	<p>In determining the quantity of land to be devoted to conservation uses under an acreage limitation program with respect to land that has been farmed under summer fallow practices, the Secretary shall consider the effects of soil erosion and such other factors as the Secretary considers appropriate.</p>	<p>Same as 1985 Farm Bill.</p>	

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
28) Land diversion payments	<p>The Secretary may make land diversion payments to producers of wheat and feed grains, whether or not an acreage limitation program for wheat and feed grains is in effect, if the Secretary determines that the land diversion payments are necessary to assist in adjusting the total national acreage of wheat and feed grains to desirable goals. The amounts payable under land diversion contracts may be determined by bids from producers or through such other means as the Secretary determines appropriate.</p>	<p>Same as 1985 Farm Bill.</p>	<p>The 1990 Farm Bill continues discretionary authority for land diversion payments.</p>
29) Special oats plantings	<p>No such provision.</p>	<p>In any crop year that the Secretary determines that projected domestic production of oats will not fulfill the projected domestic demand for oats, the Secretary may allow oats to be planted for harvest on any wheat and feed grain reduced acreage. With respect to such acreage planted to oats, the Secretary may make program benefits (including loans, purchases, and payments) in accordance with the annual program for oats; but, shall not make other program benefits available to producers.</p>	<p>The 1990 Farm Bill adds special oats provision.</p>



## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
30) a) Cross-compliance  b) Offsetting compliance	<p>The Secretary may require that, as a condition of eligibility of producers on a farm for loans, purchases, or payments, the acreage planted on the farm to any other commodity for which an acreage limitation program is in effect not exceed the crop acreage base for that commodity.</p> <p>The Secretary may not require producers on a farm, as a condition of program eligibility, to comply with the terms and conditions of the wheat and feed grains program on any other farm operated by the producers.</p>	<p>Compliance on a farm with the terms and conditions of any other commodity program, or with the crop acreage base requirements for any other commodity, may not be required as a condition of eligibility for loans, purchases, or payments under the wheat and feed grains program.</p> <p>Same as 1985 Farm Bill.</p>	<p>The 1990 Farm Bill prohibits cross and offsetting compliance as a condition for program eligibility.</p>
31) Definitions	<p><u>Program crop</u>: Includes wheat, corn, grain sorghums, oats, barley, upland cotton, or rice.</p> <p><u>Double cropping</u>: A farming practice, as designated by the Secretary, that has been carried out on a farm during at least 3 of the last 5 crop years.</p>	<p><u>Program crop</u>: Includes wheat, corn, grain sorghums, oats, barley, upland cotton, or rice.</p> <p><u>Oilseed</u>: Includes soybeans, sunflower seed, rapeseed, canola, safflower, flaxseed, mustard seed, or, if designated by the Secretary, other oilseeds.</p> <p><u>Double cropping</u>: A farming practice, as designated by the Secretary, that has been carried out on a farm during at least 3 of the last 5 crop years.</p>	<p>The 1990 Farm Bill continues to define "program crop" the same as under the 1985 Farm Bill.</p>

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
32) Crop acreage bases	<p><u>In general:</u> The Secretary shall provide for the establishment and maintenance of crop acreage bases for each program crop, including any program crop produced under an established practice of double cropping. The sum of the crop acreage bases for all program crops produced on any farm for any crop year shall not exceed the farm acreage base, except to the extent that the excess is due to double cropping.</p> <p>Crop acreage base for a program crop shall be the average of the acreage planted and considered planted (P&amp;CP) to such program crop for harvest on the farm in each of the five crop years preceding such crop year.</p> <p><u>Cotton and rice:</u> For cotton and rice only, calculation of crop base excludes all crop years in which P&amp;CP acreage was not established for the farm, but cannot exceed the average P&amp;CP acreage in each of the two immediately preceding years.</p>	<p><u>In general:</u> The crop acreage base for each program crop shall equal a 5-year average of acreage planted and considered planted (P&amp;CP) for harvest on the farm.</p> <p><u>Cotton and rice:</u> The crop acreage base for upland cotton and rice shall equal a 3-year average of acreage P&amp;CP for harvest on the farm, with the following exception: For 1991 crops of upland cotton and rice, if the producers did not participate in the 1989 and 1990 production adjustment programs, the crop acreage base for 1991 shall be a 5-year average P&amp;CP, excluding all crop years in which P&amp;CP not established, but not greater than the average P&amp;CP in each of the 2 crop years preceding 1991. For 1992 crops of upland cotton and rice, if the producers did not participate in the 1990 and 1991 production adjustment programs, the crop acreage base for 1992 shall be a 5-year average P&amp;CP, excluding all crop years in which P&amp;CP not established, but not greater than the average P&amp;CP in each of the 2 crop years preceding 1992.</p>	<p>The 1990 Farm Bill continues to determine crop acreage bases the same as under the 1985 Act, except for cotton and rice, which are determined on the basis of a 3-year moving average instead of a 5-year moving average, excluding years where cotton or rice were not planted, but not in excess of the average P&amp;CP for the last 2 years. The 1990 Act includes special provisions for the 1991 and 1992 crops of cotton and rice.</p>

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
33) Acreage considered planted	<p>Acreage considered planted to a program crop shall consist of:</p> <p>(1) any reduced acreage, set-aside acreage, and diverted acreage;</p> <p>(2) any acreage producers were prevented from planting because of drought, flood, or other natural disaster;</p> <p>(3) difference between permitted acreage and planted acreage, if acreage devoted to conserving use or to approved nonprogram crops; and,</p> <p>(4) acreage less than 20 percent of permitted acreage if planted to canola, rapeseed, sunflower, safflower, flaxseed, kenaf, crambe, guayule, milkweed, mung bean, mustard, or meadowfoam; if producers plant at least 50% of their permitted acreage and producers do not receive 0/92 or 50/92 payments.</p>	<p>Acreage considered planted to a program crop shall consist of:</p> <p>(1) any reduced and diverted acreage;</p> <p>(2) any acreage that producers were prevented from planting because of drought, flood, or other natural disaster;</p> <p>(3) acreage equal to the difference between the permitted acreage and planted acreage for a program crop, if the acreage considered planted is devoted to conservation uses or production of permitted commodities under the 0/92 or 50/92 programs;</p> <p>(4) acreage equal to the difference between the permitted acreage and planted acreage for a program crop, if the acreage considered planted is devoted to the production of commodities in accordance with planting flexibility provisions;</p> <p>(5) any acreage the Secretary determines is necessary to be included in establishing a fair and equitable crop acreage base;</p> <p>(6) the crop acreage base for the crop, if producers on the farm forgo receiving any payments for the crop and certify that no acreage on the farm was planted to: (a) the crop; or, (b) any fruit or vegetable crop (including potatoes and dry edible beans) not designated as an industrial or experimental crop by the Secretary, in excess of normal plantings; and,</p> <p>(7) any acreage on the farm for which the crop acreage base was adjusted because of a condition or occurrence beyond the control of the producer.</p>	<p>The 1990 Farm Bill adjusts acreage considered planted to be consistent with the flexibility provisions, and adds additional types of acreage that can be considered planted.</p>

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
34) Subsequent crop years (base building)	No such provision.	<p>A producer who is eligible to receive a deficiency payment for any program crop or crop of ELS cotton in any crop year may not use the acreage planted or considered planted to the program crop or ELS cotton to increase any crop acreage base established for the farm in a subsequent crop year.</p>	The 1990 Farm Bill prohibits base building if the producer is eligible to receive a deficiency payment for any program crop or crop of ELS cotton. This provision, in effect, counteracts the impacts of eliminating cross compliance.
35) Planting flexibility	No such provision.	<p>In general: Producers may plant specified commodities, other than the specific program crop, on that program crop's base without suffering a reduction in the crop acreage base.</p> <p><u>Specified commodities:</u> The commodities that may be planted on a crop acreage base are:</p> <ul style="list-style-type: none"> <li>(1) any program crop;</li> <li>(2) any oilseed;</li> <li>(3) any industrial or experimental crop designated by the Secretary; and,</li> <li>(4) any other crop, except any fruit and vegetable crop (including potatoes and dry edible beans) not designated by the Secretary as: (a) an industrial or experimental crop; or, (b) a crop for which no substantial domestic production or market exists.</li> </ul> <p><u>Limitation:</u> The Secretary may prohibit the planting of any specified crop on a crop acreage base. The Secretary shall make a determination in each crop year of the commodities that may not be planted, and shall make available a list of the commodities.</p>	<p>The 1990 Farm Bill allows producers to plant specified crops on their crop acreage base, with base protection but without payments.</p>



## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
36) Limitation on acreage for flexibility	No such provision.	<p>In general: No more than 25 percent of a crop acreage base may be planted to other specified commodities under the planting flexibility provisions.</p> <p><u>Exception for soybeans:</u> If on January 1 of any calendar year the Secretary estimates that the national average price of soybeans during the following marketing year would be less than 105% of the nonrecourse loan rate for soybeans if soybeans were to be allowed to be planted on up to 25 percent of the crop acreage base, the quantity of crop acreage base that may be planted to soybeans in regards to planting flexibility provisions may not exceed 15% of the crop acreage base.</p>	The 1990 Farm Bill allows producers to plant up to 25% of their crop acreage base to specified crops. An exception is included for soybeans, whereby under certain price conditions, the limit on soybean plantings on program crop base can be reduced to 15%. Flexibility provisions in regards to acreage planted to other crops are defined in terms of crop acreage base instead of permitted acreage, as was the case under the 0/25 oilseed program.

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
37) Loan eligibility	No such provision.	<p><u>In general:</u> Producers of an original program crop who plant for harvest another program crop on the crop acreage base of the original program crop in accordance with the planting flexibility provisions and who do not participate in the production adjustment program for the other program crop shall be eligible to receive loans, purchases, or loan deficiency payments for such other program crop on the same terms and conditions as are provided to participants in the production adjustment program established for such other program crop.</p> <p><u>Requirements:</u> Producers shall be eligible to receive loans, purchases, or loan deficiency payments if the producers: (1) plant such other program crop within 25% of the crop acreage base established for the original program crop; and, (2) agree to a reduction in the permitted acreage for the original program crop for that crop year.</p>	The flexibility provisions included in the 1990 Farm Bill allow producers to receive loans on crops planted under certain conditions, even if they do not participate in the program for those crops.

## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
38) Farm program payment yields	<p><u>In general:</u> Farm program payment yield established as average of the farm program payment yields on the farm for the 1981 through 1985 crop years, excluding the high and low years.</p> <p><u>Additional yield payments:</u> If the farm program payment yield is reduced more than 10% below the farm program payment yield for the 1985 crop year, the Secretary shall make available to producers deficiency payments for the commodity in such amount as the Secretary determines is necessary to provide the same return to producers as if the farm program payment yield had not been reduced more than 10 percent below the 1985 payment yield.</p> <p><u>No crop or yield available:</u> The Secretary may establish a farm program payment yield for a farm if the program crop was not produced on the farm during 1981 through 1985.</p>	<p><u>In general:</u> The farm program payment yield for each of the 1991-1995 crops shall be the farm program payment yield for the 1990 crop year for the farm.</p> <p><u>Additional yield payments:</u> In the case of each of the 1991-1995 crop years, if the farm program payment yield for a farm is reduced more than 10% below such yield for 1985, the Secretary shall make payments available to the producer in such amount as the Secretary determines is necessary to provide the same total return to producers as if such yield had not been reduced more than 10% below the 1985 payment yield. The payments shall be made available no later than the time final deficiency payments are made.</p> <p><u>No crop or yield available:</u> If the crop was not produced on the farm, or if no farm payment yield was established for any of the 1981-1985 crop years (or, as appropriate, the 1986-1990 crop years), the farm program payment yield may be established on the basis of the average farm program payment yield for similar farms in the area.</p>	<p>The 1990 Farm Bill freezes program yields for the 1991-1995 crops at the 1990 level.</p>

# COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
39) General terms of the farmer-owned reserve	<p>The Secretary shall formulate and administer a farmer-owned reserve (FOR) under which producers of wheat and feed grains will be able to store their commodities whenever the commodities are in abundant supply, extend the time period for the orderly marketing of the commodities, and provide for adequate carryover stocks to ensure reliable supplies. In carrying out this program, the Secretary shall provide for:</p> <p>(1) original or extended price support loans for wheat and feed grains, under conditions designed to encourage producers to store grain for extended periods to promote orderly marketing of grain during periods of abundant supply, at a loan rate not less than the current level;</p> <p>(2) repayment of the extended loans in not less than 3 years (36 months), with extensions as warranted by market conditions;</p> <p>(3) payments to producers for storage and interest charges under specified conditions; and,</p> <p>(4) assurance that producers are afforded a fair and equitable opportunity to participate in the program, taking into account regional differences in the time of harvest.</p>	<p>The Secretary shall formulate and administer a farmer-owned reserve (FOR) under which producers of wheat and feed grains will be able to store their commodities whenever the commodities are in abundant supply, extend the time period for the orderly marketing of the commodities, and provide for adequate carryover stocks to ensure reliable supplies. In carrying out this program, the Secretary shall provide for:</p> <p>(1) extended price support loans for wheat and feed grains, made available only after the expiration of the original 9-month price support loan, at a loan rate not less than that for the original loan;</p> <p>(2) repayment of the extended price support loan 27 months from the date on which the original loan expired unless, at the Secretary's discretion, the loan is extended for one 6-month period;</p> <p>(3) an interest rate and storage payment specified by provision; and,</p> <p>(4) assurance that producers are afforded a fair and equitable opportunity to participate in the program, taking into account regional differences in the time of harvest.</p>	<p>The 1990 Farm Bill requires FOR loans to be made only after expiration of the original 9-month loan (i.e., no direct entry), and specifies a potentially shorter contract period.</p>
40) Producer repayment of FOR loans	<p>Producers may repay the extended loan prior to contract maturity date only if the market price for the commodity is equal to or greater than the higher of 140% of the nonrecourse loan rate, or the target price. The Secretary may require repayment prior to maturity in emergency conditions.</p>	<p>Producers may repay the extended loan at any time during the contract period. The Secretary may require repayment prior to maturity if the Secretary determines that an emergency exists that requires the commodities under loan to be available to meet urgent domestic and international needs.</p>	<p>The 1990 Farm Bill allows producers to repay their extended loan at any time prior to the end of the contract period without regard to price triggers.</p>



## COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments
41) Interest charges on FOR loans	The rate of interest charged participants shall not be less than the rate which the U.S. Treasury charges the CCC, except that the Secretary may waive or adjust the interest as appropriate for program administration. The Secretary may increase interest at appropriate amounts and intervals to encourage orderly marketing of grain when market prices exceed reserve trigger release levels.	The Secretary may charge interest on FOR loans whenever the price of wheat or feed grains is greater than or equal to 105% of the current target price for the crop. If interest is levied, it may be charged for up to 90 days after the last day on which the price was $\geq$ 105% of the target price. The interest rate may not be less than the rate which the U.S. Treasury charges the CCC, except that the Secretary may waive or adjust the interest as appropriate for program administration.	The 1990 Farm Bill would not allow interest charges for extended loans except for periods of relatively high market prices.
42) Storage payments for FOR loans	The Secretary shall provide storage payments to producers, payable in advance, in such amounts and under such conditions as the Secretary determines appropriate to encourage participation in the FOR.	The Secretary shall provide storage payments to producers, payable at the end of each quarter, in such amounts and under such conditions as the Secretary determines appropriate to encourage participation in the FOR. The Secretary shall cease making storage payments whenever the price of wheat or feed grains $\geq$ 95% of the current target price and for any 90-day period immediately following the last day on which the price was $\geq$ 95% the price. Storage payments on FOR loans are subject to provisions related to comparability of storage payments.	The 1990 Farm Bill establishes less restrictive conditions whereby storage payments may cease. Under the 1985 Farm Bill, storage payments would cease if market prices exceeded the release price (higher of 140% of the loan rate, or the target price).

# COMPARISON OF PROVISIONS FOR THE 1985 AND 1990 FARM BILLS

	1985 Farm Bill	1990 Farm Bill	Comments												
43) Quantity of commodities in FOR	<p>The upper limit on the total quantity of wheat and feed grains shall not exceed:</p> <table><tr><td><u>Crop</u></td><td><u>Maximum in FOR</u></td></tr><tr><td>wheat</td><td>30% of total use</td></tr><tr><td>feed grains</td><td>15% of total use</td></tr></table> <p>The Secretary may establish upper limits at up to 110% of the above levels if determined to be necessary to carry out the program.</p> <p>Whenever the total quantity of wheat (feed grains) in the FOR is less than 300 million bushels (450 million bushels), and the market price does not exceed 140% of the nonrecourse loan rate, the Secretary shall encourage participation by offering higher storage payments, waiver of interest, or higher loan levels.</p> <p>The Secretary shall announce the terms and conditions of the program as far in advance of making loans as practicable. The announcement shall include the maximum quantities determined appropriate by the Secretary.</p>	<u>Crop</u>	<u>Maximum in FOR</u>	wheat	30% of total use	feed grains	15% of total use	<p>The Secretary may establish maximum quantities that may receive loans and storage payments under the FOR as follows:</p> <table><tr><td><u>Crop</u></td><td><u>Maximum in FOR</u></td></tr><tr><td>wheat</td><td>≥300&lt;450 mil bu.</td></tr><tr><td>feed grains</td><td>≥600&lt;900 mil bu.</td></tr></table> <p>The Secretary shall announce the terms and conditions of the program by <u>December 15</u> of the year in which the crop was harvested for wheat; and, <u>March 15</u> of the year after the crop was harvested for feed grains. The announcement shall include the maximum quantities determined appropriate by the Secretary.</p> <p><u>Discretionary entry:</u> The Secretary may make <u>extended loans</u> available to producers of wheat and feed grains if: (1) the Secretary determines that the average market price for wheat and feed grains for the 90-day period prior to the announcement deadline is less than 120% of the current loan rate for the crop; <u>or</u>, (2) as of the announcement deadline, the Secretary estimates that the stocks/use ratio on the last day of the current marketing year will be more than 37.5% for wheat, and more than 22.5% for corn.</p> <p><u>Mandatory entry:</u> The Secretary shall make extended loans available if <u>both</u> of the conditions described above under discretionary entry are met for wheat and feed grains, respectively.</p>	<u>Crop</u>	<u>Maximum in FOR</u>	wheat	≥300<450 mil bu.	feed grains	≥600<900 mil bu.	<p>The 1990 Farm Bill establishes a range for the maximum quantity of wheat and feed grains in the reserve. No minimum is established. Conditions are set forth whereby the Secretary either has the option, or is required, to allow entry into the reserve. Specific dates for announcing the reserve program are included.</p>
<u>Crop</u>	<u>Maximum in FOR</u>														
wheat	30% of total use														
feed grains	15% of total use														
<u>Crop</u>	<u>Maximum in FOR</u>														
wheat	≥300<450 mil bu.														
feed grains	≥600<900 mil bu.														



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## 1991 OUTLOOK FOR FRUIT AND TREE NUTS

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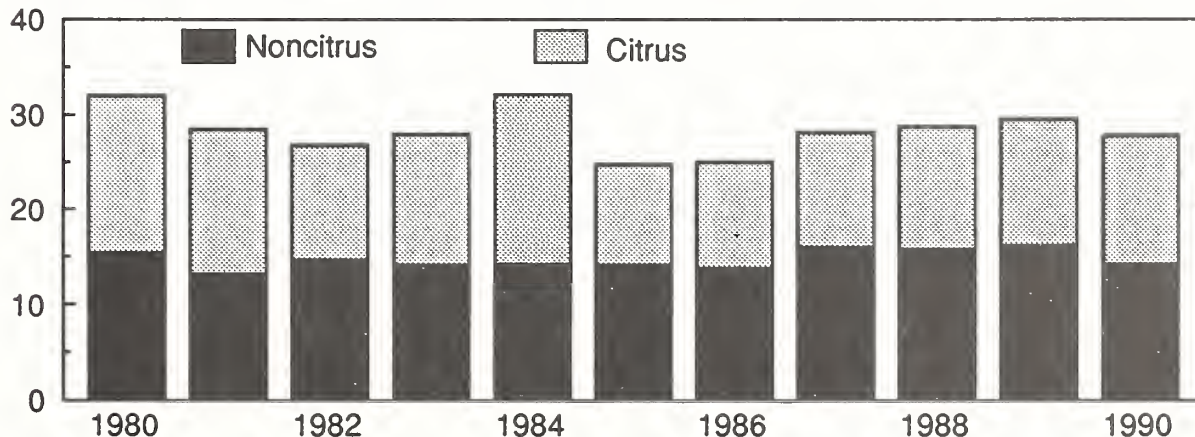
### OVERVIEW

The outlook for U.S. fruit crops is mixed in 1990/91 with shorter domestic supplies of many noncitrus fruits and expectations for the largest citrus crop in 6 years. Production prospects for many noncitrus fruit crops were reduced this year because of adverse weather conditions that prevailed this spring in some areas of the country. Consequently, production of the major noncitrus fruits is expected to decline 12 percent from 1989/90's 16.3 million short tons (figure 1). On the other hand, this season's larger citrus crop forecast primarily reflects expectations for increased production of all citrus commodities in Florida, the largest citrus producing State, after last December's freeze significantly curtailed production. Expected

Figure 1

### U.S. Total Production of Major Fruits

Million tons





larger crops of almonds, pistachios, and macadamia nuts in 1990 will more than offset smaller hazelnut, pecan, and walnut crops, and boost substantially the marketable quantity of all U.S. tree nuts in 1990/91 from last season's record.

Relatively smaller domestic fruit supplies and higher domestic prices likely will dampen per capita fruit consumption in 1990, but tree nut consumption is expected to rise with prospects for record high stocks and generally lower prices this year. A total per capita fruit consumption estimate is not available for 1989 since the industry ceased to disclose pack and stock data for most canned fruits earlier this year. However, due primarily to smaller crops for fresh market oranges, grapes, peaches, plums, and fresh prunes, 1989 fresh fruit consumption dropped 2 percent from 1988, to 96.6 pounds per person. Conversely, frozen and dried fruit consumption posted gains of 26 and 7 percent, respectively, at 4.8 and 3.2 pounds per person. Similarly, U.S. tree nut consumption was estimated at 2.4 pounds per person in 1989, up 3 percent from 1988.

While imports continue to be a relatively small portion of U.S. fresh citrus consumption, they are an increasingly important portion of U.S. fresh noncitrus fruit consumption. For example, U.S. fresh citrus imports accounted for only 2 percent of the 5.9 billion pounds of fresh citrus fruits consumed in the United States during 1988/89, unchanged since 1974/75 (figure 2). In contrast, U.S. fresh noncitrus fruit imports accounted for 42 percent of total U.S. fresh noncitrus fruit consumption in 1989, compared with 34 percent in 1975 (figure 3). While U.S. fresh citrus fruit imports are expected to remain a minor portion of total U.S. fresh citrus consumption in 1989/90, the portion of total U.S. fresh noncitrus fruit consumption accounted for by imports is expected to rise in 1990/91 with smaller U.S. domestic production of apples, peaches, and grapes, among others, and prospects for record U.S. imports of noncitrus fruits from Chile.

## GENERAL FRUIT PRICE OUTLOOK

The index of grower prices for all fruit (fresh and processing) remained at levels below a year ago through February, reflecting the lower prices paid to Florida growers for the large volume of freeze-damaged oranges and grapefruit sold to processors after the late-December 1989 freeze (figure 4). In addition, the large 1989/90 apple crop kept grower prices for apples lower than a year ago, placing downward pressure on the index until supplies of storage apples began to wane in late spring. The index made an appreciable jump in April, mirroring the higher prices paid to growers for a shorter peach crop on the East Coast and strong demand for California production. After dipping in June as harvest of most noncitrus fruits commenced, the index advanced again in July, boosted by strengthening grower prices for apples and peaches. The decline in the index this fall was prompted by a softening in grower prices for grapefruit, oranges, apples, and pears. Lower prices for lemons, oranges, and tangerines provided downward pressure relative to a year ago. The larger citrus crops



Figure 2

## U.S. Fresh Citrus Consumption

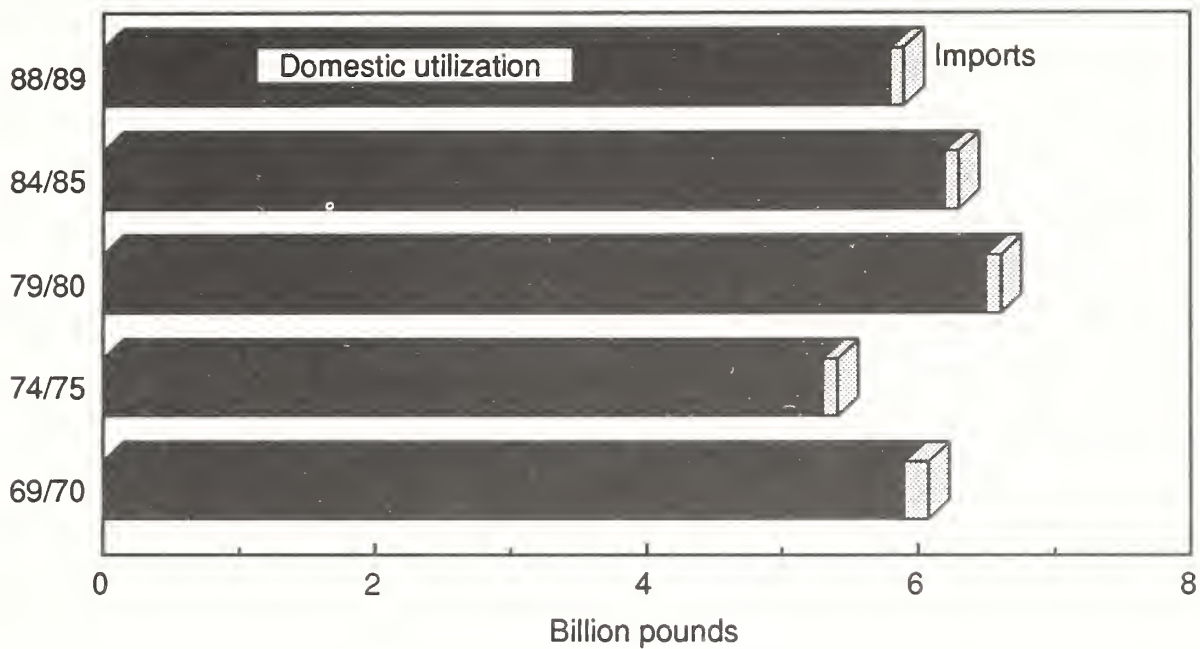
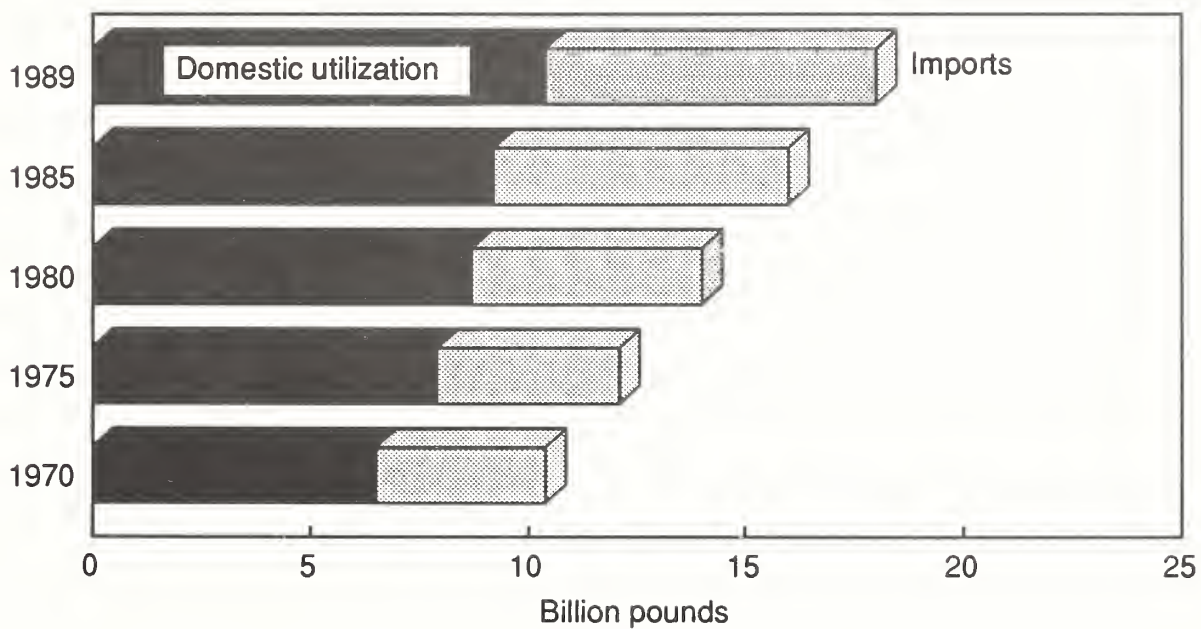


Figure 3

## U.S. Fresh Noncitrus Consumption



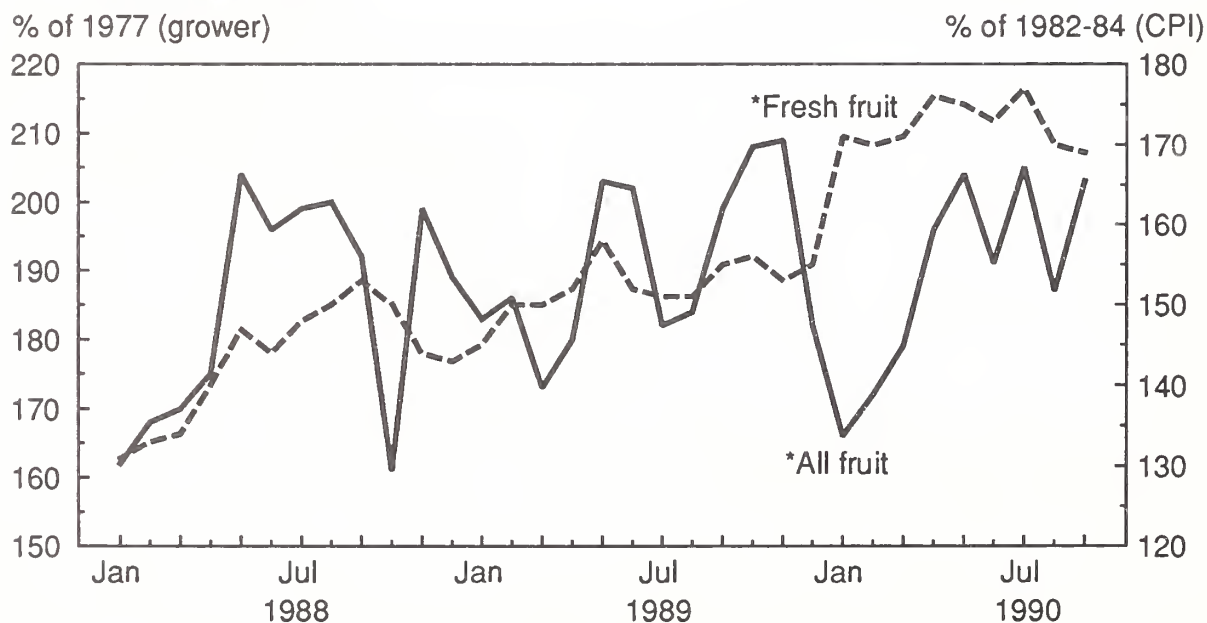
expected in 1990/91 should continue to keep downward pressure on the index through the winter, offsetting expected higher prices for apples and pears.

Retail prices for fresh fruit as measured by the Bureau of Labor Statistics' (BLS) Consumer Price Index (CPI) remained strong through July, supported by shorter supplies of several important noncitrus fruits, including apples, bananas, and peaches, and strong demand for fresh oranges, grapefruit, and lemons. Although the index weakened from July's record 176.6 (1982-84=100), the August and September levels remained 8 percent above a year earlier. Lower retail prices for oranges and grapefruit are providing downward pressure on the index this fall and are expected to continue doing so through the winter. However, higher marketing costs and other inflationary pressures are expected to provide upward pressure on retail prices for all fresh fruit.

The CPI for processed fruit has also shown strength this year primarily due to the tight supplies of frozen concentrated orange juice (FCOJ) following last December's freeze and the record-high wholesale and retail FCOJ prices that ensued. After hitting a record 140.1 (1982-84=100) in July, the index was relatively unchanged through September, although it remained 11.6 percent above a year earlier. The index is expected to weaken in November as wholesale FCOJ price breaks, announced by Florida processors and Brazilian exporters in August, reach the retail level. Moreover, the canned and dried component of the processed fruits CPI, which has remained unchanged over the past 3 months, is not expected to provide much change over the next few months.

Figure 4

## U.S. Fruit Prices



\*Fresh fruit-CPI and all fruit-grower.

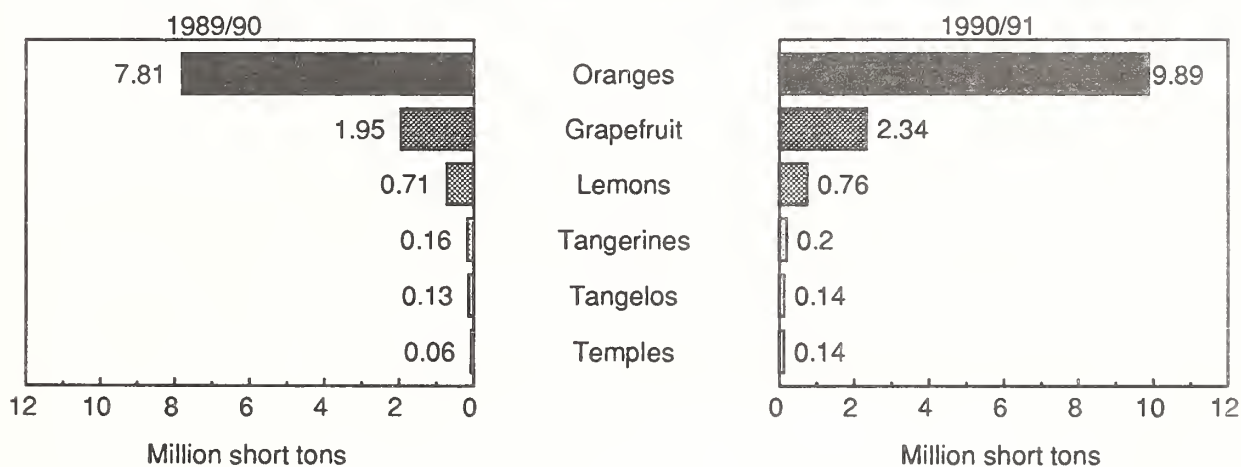
## COMMODITY OUTLOOK

### Citrus

USDA's first forecast for the 1990/91 U.S. citrus crop released in October placed total production (excluding production in California's "other areas") at 13.48 million short tons, up 26 percent from last season and the largest crop in 6 years (figure 5). This season's larger crop forecast reflects expectations for increased production of all citrus commodities in Florida following last December's freeze, while California and Arizona are expected to have a mixed season with a smaller orange crop offsetting larger grapefruit and lemon crops. Because of the severe damage to Texas orange and grapefruit trees during the December 1989 freeze, the State currently does not expect to harvest a commercial crop this season and Texas citrus production forecasts will not be made unless significant commercial volumes become available.

Figure 5

#### U.S. Production of Selected Citrus Fruit



### Oranges

Prospects for the 1990/91 orange season (November/October) point toward larger domestic supplies of processing oranges and smaller fresh market supplies. In Florida, where over 90 percent of the State's orange crop is typically processed, production in 1990/91 was forecast at 7.43 million short tons. If realized, the crop will be up 50 percent from 1989/90's freeze-damaged crop and 13 percent greater than the previous season. The larger forecast this season is the result of a large number of young trees (those under 5-years-old) reaching bearing age in the southern part of the State, where trees were relatively unaffected by the freeze. In addition, good growing conditions throughout the year resulted in a heavy bloom



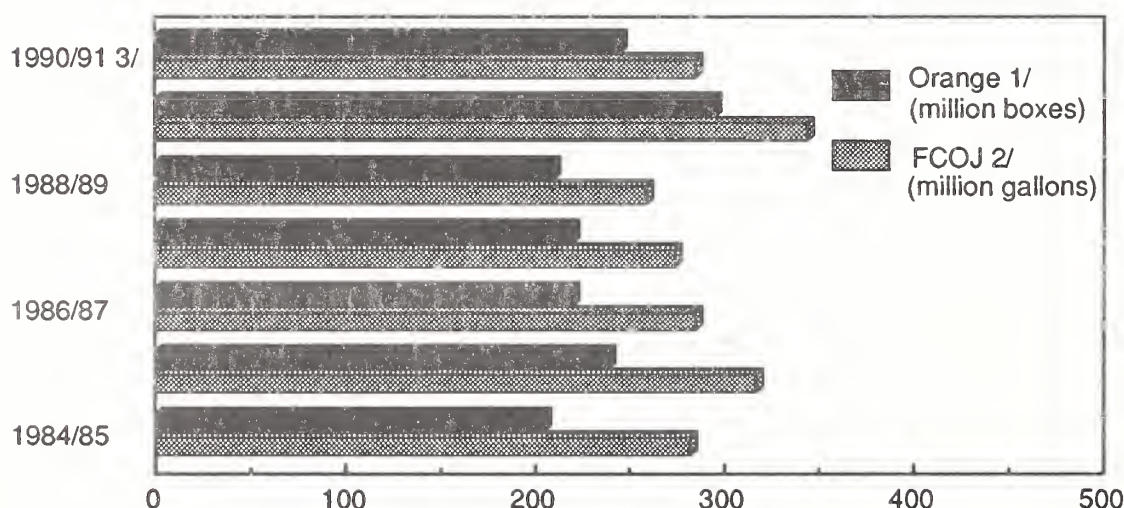
and fruit set. Extremely early maturity has occurred because of the good growing conditions. This season's juice yield is expected to reach 1.52 gallons per box (42 degrees Brix), up 24 percent from the yield attained from last season's freeze-damaged fruit, and relatively unchanged from 1988/89's 1.54 gallons per box.

Florida's improved crop prospects and forecasted higher juice yield are expected to result in a larger domestic orange juice pack in 1990/91. The larger pack will ease the tight inventories and record-high wholesale and retail prices for frozen concentrated, chilled, and canned orange juices that prevailed through the year. In October, the Florida Department of Citrus forecast the 1990/91 Florida orange juice pack at 956.8 million gallons (42 degrees Brix), up 76 percent from last season. Overall, the Florida Department of Citrus estimates that the total Florida orange juice pack will represent 70.4 percent of total expected U.S. orange juice supplies in 1990/91, a significant rise over the 48-percent share estimated for last season.

U.S. imports of frozen concentrated orange juice (FCOJ), primarily from Brazil, are expected to drop-off significantly in 1990/91. Currently, Brazil's Sao Paulo State is expected to process 210 million boxes of oranges in 1990/91 (July/June), down 18 percent from last season's record (figure 6). Despite the lower production, Brazilian juice stocks are higher than expected due to sluggish U.S. FCOJ demand in response to record-high prices. Recently, world FCOJ prices have dropped in response to the larger than expected 1990/91 Florida orange crop forecast and trade expectations for a record Brazilian orange crop in 1991/92. Despite prospects for the larger Brazilian supplies and lower export prices in the months ahead, U.S. FCOJ imports are expected to decline in 1990/91 because of the increase in domestic orange juice availability and lower domestic prices.

Figure 6

### Brazilian Orange Production and FCOJ Supply



1/ Sao Paulo. 2/ 42 degree Brix. 3/ Florida Department of Citrus estimate.



U.S. orange juice consumption is expected to rebound in 1990/91 after record-high prices curtailed demand in 1989/90. For 1990/91, the Florida Department of Citrus estimates retail orange juice prices will average \$3.76 per single-strength-equivalent gallon, 11.5 percent lower than 1989/90. The decline in retail prices is projected to stimulate increased 1990/91 retail orange juice sales in retail outlets with annual sales in excess of \$4 million by 18 percent from last season's 636.8 million gallons (single-strength-equivalent).

In October, the 1990/91 California orange crop was forecast at 2.4 million short tons (64 million boxes), down 12 percent from last season, but 9 percent above 1988/89. Smaller navel and Valencia orange crops are expected in the State. However, the larger Florida and Arizona orange crops expected in 1990/91 will help to offset smaller California production and keep downward pressure on fresh market orange prices. This will limit prospects for appreciably higher grower prices for California growers despite the State's smaller crop. In 1989/90, California orange growers benefitted from the short fresh market conditions in the Eastern States that were created by last December's freeze in Florida and Texas and from strong export market demand.

### Grapefruit

The 1990/91 U.S. grapefruit crop, excluding production in California's "other areas," is forecast at 2.34 million short tons (56.6 million boxes), 31 percent larger than last season, yet 13 percent smaller than 1988/89. Larger crops are expected in Florida, the California desert region, and in Arizona. Due to damage to Texas grapefruit trees inflicted by last December's freeze, forecasts for Texas production will not be made this season unless significant commercial volumes become available.

In October, the 1990/91 Florida grapefruit crop was placed at 2.15 million short tons (50.5 million boxes), up 41 percent from last season if the forecast is realized. Production prospects in the California desert region and Arizona, as of October, point toward a combined crop about 4 percent larger than last season's 188,000 short tons. Although grower fresh market prices are expected to range lower this season, Florida growers are likely to achieve higher returns with the increase in available supplies. Conversely, California and Arizona grapefruit growers who received record-high grower prices last season are expected to see lower returns in 1990/91 as Florida re-enters the market.

The larger 1990/91 Florida grapefruit crop will lead to a resumption in export activity as well as a larger pack of frozen concentrated grapefruit juice (FCGJ) this season. Although domestic fresh market demand is expected to be strong, exports should account for over one-half of total fresh market grapefruit shipments in 1990/91. In October, the Florida Department of Citrus estimated that Florida processors will utilize 42 percent of the total Florida grapefruit crop to pack 26 million gallons (40 degrees Brix) of FCGJ, 15 percent more than last season. The increase in fresh market and processing grapefruit should keep downward pressure on retail prices this season.

## Lemons

The tight domestic lemon supplies experienced over the past 3 seasons are expected to ease in 1990/91, with production forecast at 764,000 short tons (20.1 million boxes), up 8 percent from last season and 1 percent from 1988/89. This season's forecast reflects expectations for larger crops in both Arizona and California at 118,000 and 646,000 short tons, up 7 and 8 percent, respectively from last season.

Heavier lemon supplies have put downward pressure on grower and f.o.b. prices this season, particularly for fresh market lemons. On the other hand, on-tree prices for processing lemons are much improved in both States, reflecting strong processing demand this season. Consequently, a larger proportion of the crop is expected to move into the processing market in 1990/91, a reversal in the trend toward larger fresh market utilization established over the past 4 seasons.

## Noncitrus

Total production of the key noncitrus fruits--including the major tree fruits, grapes, and strawberries--is forecast at 14.0 million short tons, down 8 percent from 1989 (table 1). The smaller crop expectation is the result of smaller apple, sweet and tart cherry, grape, peach, and prune and plum production, which offset relatively larger crops for apricots, nectarines, pears, and strawberries. Consequently, prices for most noncitrus fruits are above last year.

Table 1--U.S. Production of Selected Noncitrus Fruit, 1987-90

Commodity	1987	1988	1989	1990	Change from 1989
	--1,000 short tons--				Percent
Apples	5,371	4,566	4,983	4,736	-5
Apricots	114	102	117	122	4
Cherries	395	304	332	234	-30
Grapes	5,267	6,034	5,931	5,461	-8
Nectarines	191	200	200	205	3
Peaches	1,191	1,307	1,167	1,061	-9
Pears	939	861	917	939	2
Prunes/Plums	977	738	1,012	702	-31
Strawberries	559	590	532	563	6
Total	15,004	14,702	15,191	14,023	-8

Source: National Agricultural Statistics Service, USDA.

## Apples

Curtailed mostly by poor weather conditions this year in the major producing areas, the final forecast for the 1990 U.S. apple crop placed production at 9.47 billion pounds, down 5 percent from 1989. Hot summer weather in Washington, the leading apple producing State, caused small fruit size and a 6 percent smaller crop than last year's. Adverse spring weather and hail damages in the Central States, combined with hot, dry weather in Missouri also reduced the region's production 20 percent from last year. On the other hand, production in the Eastern States is forecast up 6 percent, although spring frost, scab, and cracking lowered quality in some areas in the region.

Generally, lower quality and strong processing demand should result in a larger portion of the crop going into processing uses this year. In August, the International Apple Institute (IAI) projected 1990/91 apple utilization for processing at 4.0 billion pounds, virtually unchanged from last season. However, the estimate represents 41.4 percent of the total 1990 crop, compared with 40.6 percent last season.

The smaller crop and brisk shipments through the end of October have boosted fresh apple prices well above a year ago. Smaller storage inventories, combined with strong domestic and export demand will continue to keep prices above last year and greatly improve the returns to growers this season.

## Grapes

The August 1, 1990 forecast of the total U.S. grape crop placed production down 8 percent from last year, at 5.5 million short tons, and almost 9 percent below 1988's bumper crop. In California, the largest grape producing State, production of raisin-type grapes was forecast down 12 percent, wine-type grapes down 4 percent, and table-type grapes down 3 percent. This year's crop had good-to-excellent quality for all grape types. Smaller fruit in Washington, cold rains in Pennsylvania, and poor fruit size in New York also resulted in smaller crop expectations in those States. Smaller table grape supplies this season have boosted retail prices above year-earlier levels, but prices should begin to decline with the start of the Chilean deal in November. According to the Chilean Exporters Association, total Chilean table grape exports are projected at 75-million boxes this season, up about 17 percent from last season. Over 50 percent are expected to be shipped to U.S. markets.

## Pears

The final forecast for the 1990 U.S. pear crop placed production at 939,000 short tons, up 2 percent from last season and equal to 1987's record harvest. Most of the increase in this year's crop was for California and Oregon Bartletts; production of pears other than Bartlett is forecasted to be about the same as in the previous year. Bartlett pears are used primarily for processing. Although carryover stocks and pack data are no longer available from the



industry, indications are that the healthy demand for canning Bartletts of the past several seasons will continue in 1990. In July, a trade source estimated that of the total volume of Bartletts (other than red) expected this year, approximately 63 percent will be canned, 12 percent will be processed into byproducts, and 25 percent will be sold fresh. The trade also estimated that 15 percent of the expected red Bartlett harvest would be processed. In 1989/90, 76 percent of total utilized Bartlett production was processed.

With larger production in Washington expected to offset a smaller Oregon crop, and production in California virtually unchanged from last year, supplies of pears other than Bartlett are expected to be adequate in 1990. Over 85 percent of other pear varieties are usually sold in fresh markets; the remainder are pressed into juice or canned.

In the past few years, grower prices for fresh and processing pears have remained strong despite consistently larger crops. This trend is expected to continue in 1990/91 with good demand from processors and in export markets for fresh market pears. However, attractive U.S. fresh market prices in recent years have encouraged pear plantings in exporting countries such as Chile and Argentina. As more trees in these countries are reaching bearing age, U.S. pear growers are facing mounting competition in domestic and foreign markets. With prospects for rising U.S. fresh pear imports and consistently larger domestic crops, grower prices would be expected to decline, particularly during the spring and summer months when imports compete with domestic pears being marketed from storage.

### **Stonefruit**

Adverse weather conditions early in the spring reduced crop prospects for peaches, sweet and tart cherries, and California prunes and plums. These smaller crops offset larger production of nectarines and apricots, resulting in smaller supplies of U.S. stonefruit in 1990.

Following freezing temperatures in March that significantly reduced 1990 peach prospects along the East Coast, the final forecast for the 1990 U.S. peach crop placed production at 2.12 billion pounds, down 9 percent from last season and the smallest crop since 1985. Production in South Carolina, the second largest peach producing State, took a hard hit from the adverse weather, which reduced prospects 67 percent from last season's 270 million pounds. New Jersey production prospects were also lowered 36 percent from last year's 70 million pounds, but adverse weather conditions this spring had little effect on the California freestone and clingstone crops, which were both forecast up about 1 percent each, at 530 million and 1.0 billion pounds, respectively.

As a result of the smaller fresh market supplies, grower, wholesale, and retail prices for fresh peaches have remained well above a year ago through the summer. However, with California clingstone production about the same as last year's, grower prices for canning peaches have remained relatively unchanged.



## Tree Nuts

In spite of smaller production for most U.S. tree nut crops (almonds, walnuts, pecans, pistachios, hazelnuts, and macadamias) in 1989, the U.S. marketable supply of all tree nuts, including imports, is estimated to have reached a record 1.34 billion pounds (shelled basis) during 1989/90, up 5 percent from the prior season. As a result, total grower cash receipts fell 11 percent from 1987's record \$1.13 billion (figure 7). The outlook for 1990 is much the same, as large carryin stocks and above normal production of most tree nut crops are expected to result in record supplies. For 1990, the marketable quantity of all U.S. tree nuts will total a record 1.5 billion pounds (shelled basis), up 11 percent from last season. Of the 6 major U.S. tree nut crops, only pecan supplies are smaller than last season's (table 2).

However, these abundant supplies are available at a time when foreign tree nut supplies, especially Turkish hazelnuts and Spanish almonds, are lower. Consequently, U.S. domestic tree nut use and exports are expected to exceed previous records (figure 8).

Table 2--Tree nuts: Production in principal States, 1988-89, and indicated 1990

Crop and State	1988	1989	Indicated 1990	Crop and State	1988	1989	Indicated 1990
	--1,000 pounds-- (shelled basis)				--1,000 pounds-- (in-shell basis)		
Almonds:				Pecans:			
California	590,000	490,000	655,000	North Carolina	5,500	700	1,500
				South Carolina	6,500	1,000	1,200
				Georgia	110,000	85,000	90,000
				Florida	6,000	7,000	3,600
Macadamia nuts:				Alabama	10,000	22,000	8,000
Hawaii	45,500	50,500	--	Mississippi	10,000	8,500	4,000
				Arkansas	3,000	1,000	400
Pistachios:				Louisiana	22,000	14,000	5,000
California	94,000	39,000	115,000	Oklahoma	47,000	9,000	6,500
				Texas	60,000	55,000	65,000
				New Mexico	26,000	29,000	31,000
				California	2,200	2,000	3,000
				Other 1/		16,300	17,900
				Total	308,200	250,500	237,100
				Improved varieties 2/	185,500	161,000	166,650
				Native and seedling	122,700	73,200	52,550
Hazelnuts:							
Oregon	16,300	12,800	21,500				
Washington	200	200	300				
2 States	16,500	13,000	21,800				
Walnuts, English:							
California	209,000	229,000	225,000				

-- = Not available.

1/ Arizona, Kansas, Missouri, and Tennessee, beginning with the 1989 crop. No breakdown between varieties available.

2/ Budded, grafted, or topworked varieties.

Source: National Agricultural Statistics Service, USDA.

Figure 7

## U.S. Tree Nut Supply vs. Grower Cash Receipts

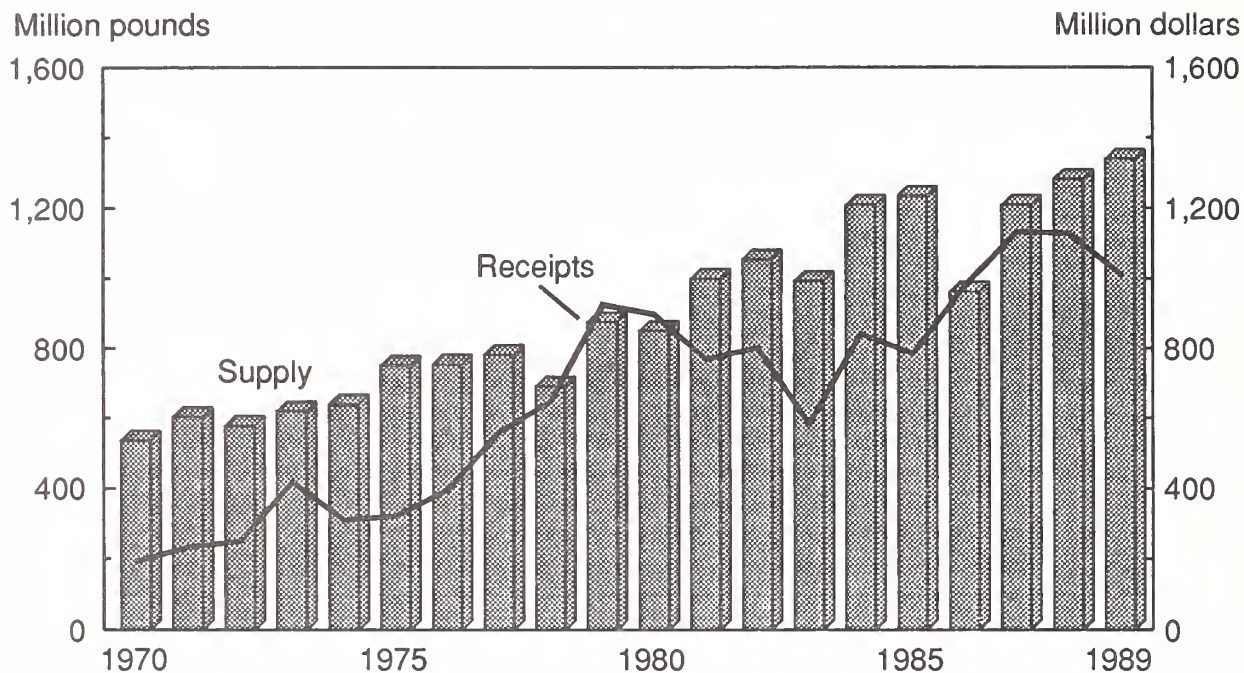
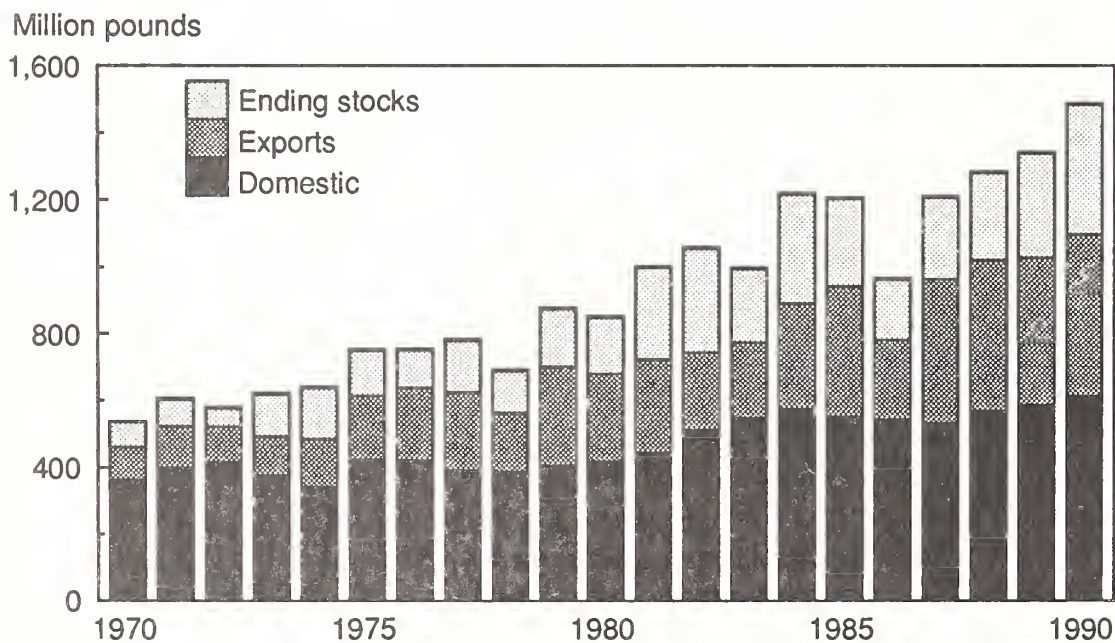


Figure 8

## U.S. Tree Nut Utilization



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
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Outlook '91, Session #C10

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## OUTLOOK FOR VEGETABLES

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### *Highlights*

The vegetable industry of the 1990's is strong, resilient, and multifaceted. This year's projected record production of fresh and processed vegetables, following above trend output seen throughout the 1980's, illustrates the gathering strength in the industry and the continuing increase in consumer demand. The resilience of the industry is demonstrated by its ability to respond to heightened consumer concern about pesticide residues with changed production practices and increased caution with chemical use. The industry is also increasingly diverse--in the type of vegetable farms operated and the marketing outlets, and in the number, assortment, and timing of products being offered.

Increased domestic consumption of fresh vegetables mirrors the upward trend in U.S. vegetable output. Domestic consumption of the major fresh vegetables increased 3 percent to 102 pounds per person in 1989, with lettuce, broccoli, and sweet corn showing the biggest gains, while processing vegetable use fell slightly. For potatoes, the 2 percent increase in total consumption in 1989 was due to increased use of french fries, chips, and other processed products. Americans now use 50 pounds of fresh potatoes and 76 pounds of processed, compared with 62 and 60 pounds, respectively, in 1970.

The outlook for domestic consumption of vegetables during the 1990's is bright. Gains from population growth, changing preferences, and rising incomes can be expected. Scientific studies continue to support the view that vegetables in the diet play a critical role in maintaining and promoting health, and that substantial portions of the population could improve their health with increased vegetable consumption. Americans continue to respond as the scientific community persists in communicating this message.



At the same time, Americans are increasingly concerned about food safety, and pesticide use remains a key issue in the vegetable industry. In 1990, an industry survey of fresh fruit and vegetable consumers indicated that 60 percent of respondents reported concern about chemical residues on produce, although not enough to alter their purchasing habits. However, the number of respondents who are concerned enough to change their purchasing habits climbed to 26 percent this year, from 18 percent in 1988 and 1989. The number of respondents describing themselves as not very concerned has dropped from 19 percent in 1988 to 14 percent in 1990.

In 1989, 53 percent of the respondents who had changed their buying habits were buying alternative fresh fruit and vegetable items, while 16 percent were buying more processed items and 13 percent were buying less fresh overall. In the 1990 survey, the number of respondents buying alternative items climbed to 62 percent. Although the survey does not identify the alternate items, the number of supermarkets advertising pesticide-residue-free produce has been increasing, and sales of organic produce in natural food stores has increased. Also, the new farm bill provisions on national certification of organic is one of several influences which may increase the availability of organic produce in the high-volume supermarket chain outlets during the decade.

The organic produce market is only one of several niche markets for specialty vegetables which may grow during the 1990's. The market for fresh-cut herbs and for fresh specialty vegetables, like jicama, chayote, and other homeland Hispanic vegetables, are both likely to expand substantially in the next few years. The use of herbs and specialty vegetables in various processed products may also increase, as companies continue the trend in introducing new products with regional flavor. Also, the market for vegetables like sweet onions and artichokes, which have been available only during certain months, may expand as mid-winter varieties and improved storage techniques are developed.

Vegetable farms are getting larger, and some of the top growers are producing specialty vegetables in addition to the mainstream vegetable crops. According to the most recent census, vegetable acres per farm increased from 45 in 1982 to 54 in 1987. A recent industry survey reported that the top 100 vegetable producers in the United States harvested over 638,000 acres of fresh and processed vegetables in 1990 (including crops from multiple-cropped acreage and from rented or leased land). The largest company, headquartered in Florida, operated almost 30,000 acres in five U.S. locations.

Most vegetable operations are diversified, giving growers some flexibility as the environment for agriculture changes during the 1990's. According to a recent ERS study, 41 percent of the vegetable growers (excluding dry beans and potatoes) in 15 top vegetable-producing States also grow program crops. Those growers producing both vegetables and program crops operated much more acreage than other vegetable growers, had higher average net cash returns, and were more likely to be full-time operators and to be family-held corporations. In a recent USDA survey of onion growers in the seven top onion-producing States, all of the respondents indicated that they also grew other vegetables, fruit crops, livestock, program commodities, or other field crops.



The appeal of the vegetable industry is also enhanced by the expansion of marketing outlets. The number of farmers' markets in the U.S. nearly doubled during the 1980's, from 1,200 in 1980 to 2,000 this year. The number of small and part-time or hobby farmers serving these farmers' markets and local wholesale and roadside markets, and providing pick-your-own operations is also increasing. In Virginia, for example, the number of farms selling vegetables and herbs directly to consumers increased from 28 in 1989 to 37 in 1990.

The vegetable industry faces significant challenges and opportunities in the 1990's, including increased production costs, stiffer competition for the domestic vegetable market, and the creation of new markets elsewhere. These issues are discussed after a brief summary of market conditions for this year's vegetable crop.

### *1990/91 Commodity Outlook*

In 1990, vegetable production is expected to exceed a 15-year trend (1975-89) for the second consecutive year, largely because of record large processing tomato and fresh onion crops, a near-record dry bean crop, and larger fall potato and sweet potato crops.

#### **Fresh Vegetables**

The index of prices received by farmers for major fresh vegetables is expected to fall 4 percent in 1990. Although prices started out high in 1990 because a hard freeze destroyed much of the U.S. winter vegetable crop, especially Florida's tomatoes, prices subsequently fell sharply because of larger-than-normal spring vegetable output. Generally favorable growing conditions following the freeze, and fewer disease problems in Western lettuce areas contributed to larger output in the summer as well.

Mirroring the movement of grower prices, the consumer price index (CPI) for fresh vegetables (including potatoes) declined 20 percent during the second quarter from its record high in the first quarter. The severe winter freeze had an especially heavy impact on last winter's retail prices for tomatoes, peppers, and cabbage. Although producer and consumer prices fell this spring and summer, they can be expected to rise seasonally this fall because growers have planted fewer acres. Increased transportation costs due to higher fuel prices may also cause prices to rise. Transportation charges as a percent of retail cost in the Northeast, for example, have averaged 16 percent for California iceberg lettuce and 6 percent for Florida tomatoes over the last 5 years.

Although USDA consumption statistics do not include many of the new specialty vegetables being offered to consumers, the increasing availability and number of varieties of vegetables is reflected. While lettuce, tomatoes, and onions remain the top three most popular tender fresh vegetables, the share of all

other vegetables has increased slightly since 1980. Americans used 29 pounds of lettuce per person in 1989, 18 pounds each of onions and fresh tomatoes, and 37 pounds of 13 other tender fresh vegetables.

### Processing Vegetables

Strong demand and low beginning stocks prompted processors for the four principal processing vegetables (snap beans, sweet corn, green peas, and tomatoes) to contract for 9 percent more acreage in 1990. Output for these processing vegetables is expected to have increased 10 percent to 15.5 million short tons with tomatoes accounting for two-thirds of total output.

U.S. growers are expected to produce a record 10.5 million tons (including 10.3 million tons of contract production) of processing tomatoes in 1990, with 90 percent grown in California. Although this output is below original estimates of nearly 11 million tons for contract production, it is dramatically above the 1970 through 1989 trend. Demand from new U.S. processing facilities, primarily in California, was an important reason for the larger crop.

Although there was evidence of softening this summer, the producer price index for frozen vegetables averaged 3 percent higher than a year ago during the first half of this year. For canned vegetables, the PPI came down slightly from a year ago during first-half 1990. Wholesale prices for canned tomato products, especially paste, fell in the wake of the expected surge in processing tomato output. However, the consumer price index (CPI) for both canned and frozen vegetables has increased throughout 1990, and is expected to average 1 to 3 percent over the 1989 level and 12 to 14 percent over 1988.

Statistics for the first 8 months of 1990 indicate that tomato paste, green peas, and other canned vegetable imports are lower compared with last year. Green pea imports had expanded in 1989 to offset domestic production losses the previous year, and are now returning to their pre-drought levels.

### Potatoes and Dry Beans

Relatively strong potato and dry bean prices during the past year encouraged increased acreage of these items in 1990. Despite continued severe drought in the Red River Valley of North Dakota and Minnesota and a blistering heat wave in the Northwest, expanded acreage boosted the 1990 potato crop 6 percent over last year's 370.4 million cwt. A near-record dry bean output of 31.5 million cwt is expected in 1990, up 33 percent from 1989 and only 1 percent below the 1981 record set when exports (especially to Mexico) were at their peak.

While the bulk of the U.S. potato crop is produced for domestic consumption, almost a third of the dry bean crop is grown for export. Output of pinto, navy, red great northern, and red kidney beans--the top four classes--is expected to be up in 1990. Production of other beans, including black beans and limas, is also expected to be up.

The outlook for the 1990/91 season indicates stronger supplies and grower prices generally below a year earlier for dry beans. The larger 1990/91 potato crop may result in grower prices slightly below a year ago, but strong processing demand and increased shrinkage in the fall crop will prevent prices from falling much below last year's level. With potato growers on the verge of a third consecutive year of relatively strong prices, acreage planted in 1991 may remain near this year's level. If yields improve, next year could see increased potato output.

The CPI for fresh vegetables is heavily weighted toward potatoes, and has been running above trend since 1987 largely due to drought-shortened supplies and strong processing demand for potatoes during the past couple of years. Increased potato production this fall is expected to moderate the fresh CPI, but elevated shipping costs caused by the recent surge in fuel prices could offset any supply-induced decline in fresh potato and vegetable prices in the coming months.

Exports of dry beans were 25 percent higher during the first 8 months of 1990 than during this period last year. Overall volume through August was 5.6 million cwt. Sales of navy beans (up 41 percent) and Great Northern beans (up 19 percent) both exceeded levels of a year earlier, while pinto beans fell 39 percent. Together these three bean classes accounted for 57 percent of the 1989 exports of dry beans. The United Kingdom continues to be the major foreign market for U.S. dry beans, followed by Japan, France, and Algeria.

### *Market Niches*

#### **Specialties**

Although the market for specialty vegetables is small, it is expanding more rapidly than the rest of the industry. Supplies, including imports, of specialty vegetables in 1989 are expected to be up 12 percent from 1988 and are likely to be up another 12 to 15 percent in 1990. The biggest gains in 1989 were for oriental vegetables (up 29 percent), Southern and snow peas (up 19 percent), and tropical fruits and vegetables (18 percent).

California, the largest supplier of specialty and minor vegetables, reported a 17-percent increase in production of these vegetables in 1989 over the previous year. Specialty vegetables, including oriental vegetables, herbs and spices, rappini, and chili peppers, showed the biggest increases in production. The market for baby vegetables is also expanding, and California reported harvesting nearly 1,300 acres in 1989. Domestic production of ginger root, which is concentrated in Hawaii, was a near-record 9.5 million pounds in 1990, and good demand is reported both domestically and worldwide.

Various data sources, including Market News Service arrivals and shipments, and Census of Agriculture acreage and production estimates, indicate that the market for fresh herbs has expanded during the 1980's. Fresh herbs arriving into major U.S. cities are likely to be over 300,000 cwt in 1990, up slightly

from the previous year. Almost 62 percent of the arrivals in 1989 were from California, followed by Florida and Mexico and various other States.

Although ethnic food stores are still an important marketing outlet for specialty vegetables, high-volume retailers institutionalized the specialty section as an important, image-building part of the supermarket produce department during the 1980's. The market for specialties will continue to grow during the 1990's as the appeal of unusual produce grows and the population of various ethnic groups increases. Price may come down for some of these high-cost vegetables as the number of producers increases, and as growers and retailers further develop production and marketing technologies.

### **Organic**

In contrast, although the market niche for organic produce has grown dramatically during the past decade, there are significant obstacles which could slow the growth of this market during the 1990's. Resistance to premium prices and actual or perceived supply problems were the leading obstacles cited in recent surveys of wholesalers, retailers, and consumers. Price premiums can be substantial at both the wholesale and retail level. For example, for the last 18 months, the weekly wholesale price for organic romaine lettuce reported in a California industry report (The Organic Wholesale Market Report) averaged over 100 percent higher than price reported for the Los Angeles terminal market report.

Price premiums reported in the November 6 issue for a variety of commodities were also high: 119 percent for iceberg lettuce, 96 percent for romaine, 147 percent for russet potatoes 101 percent for carrots, and 200 percent for tomatoes. Health food stores are still the primary outlet for organic produce and expansion of organic products into high-volume supermarkets may be difficult because of institutionally prescribed standards on profitability and supplies.

## ***Influences on Vegetable Production in the 1990's***

### **Availability of Pesticides**

The outcome of the public debate on pesticide use in agriculture may have more influence on vegetable production in the 1990's than any other issue. Although Big Green and other environmental initiatives on State ballots this month "wilted" according to The Economist, the continued availability of pesticides to vegetable growers is far from certain. The growing influence of consumer and environmental groups seen in the 1990 farm bill, with the passage of measures on sustainable agriculture and organic certification, is likely to continue. But although growers have been reducing their use of pesticides in response to consumer concern about residues, pesticides still play an important role in vegetable production.

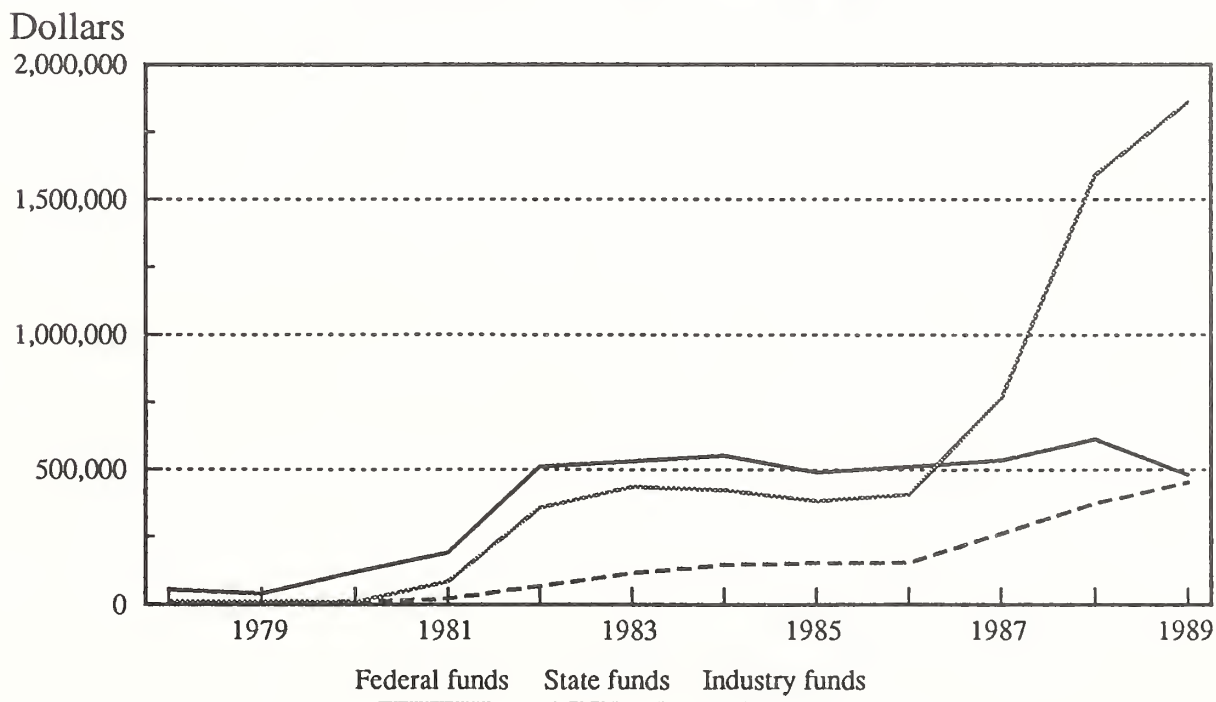


The Food and Drug Administration reports that pesticide residues do not pose a significant threat in the American diet. In 1989, approximately 68 percent of both the domestic and imported vegetables sampled by the FDA were completely pesticide-residue-free. Residue violations were found on only 1.5 and 4.5 percent of the domestic and imported samples, respectively. FDA indicates that in the majority of these violations, the pesticide residue was below legally safe limits on other food crops but had not been registered for use on the particular vegetable tested. Also, even though imported produce had higher violation levels overall, major imported commodities may have fewer violations than domestic. For example, imported potato and tomato samples had no residue violations in 1989.

Other concerns about agricultural pesticide use, likely to be addressed in the 1990's, include groundwater contamination and farmworker exposure. At this time there is little statistical evidence available, but it appears that, on the whole, U.S. vegetable growers now are using fewer pesticides. In the near future good data will be available. In January 1990, California began collecting data on all pesticide use, USDA is currently conducting a survey at the national level, and the new farm bill legislation contains a provision requiring growers to keep pesticide-use records.

Vegetable growers have increased their use of integrated pest management (IPM) substantially during the 1980's. IPM combines the use of crop rotations, resistant varieties and other cultural and biological methods, using pesticides only when pest populations are at economically damaging levels.

## Vegetable IPM Funding



Source: Extension Service, USDA

State IPM extension projects are funded by some combination of State and federal funds and grower payments to extension programs, private consultants, firms, grower organizations and co-ops. Combined IPM funding for vegetable projects funded wholly or in part by Federal funds rose from approximately \$64,000 in 1978, when funds were largely focussed on field crops, to almost \$3 million in 1989.

A major shift toward industry and State funding of vegetable IPM has also taken place during the 1980's. While Federal funds have remained fairly constant at about half a million dollars, State funds have tripled to almost half a million, and industry funds have quadrupled to almost \$2 million. Florida is where the most dramatic increase in funding has taken place, largely from industry sources.

Further adoption of IPM in the vegetable industry and more intensive use of IPM could continue to decrease the amount of pesticides used on vegetable crops. However, while IPM emphasizes a variety of pest control techniques, its effectiveness depends on the continued availability of pesticides. Although the groundwork for a variety of alternatives is now being set, including new superactive biocontrol agents and genetically-engineered crops, most of these revolutionary new pest control techniques will not be available during the 1990's.

#### Availability of Water, Labor, and Land

California and Florida earned \$3.7 and \$1.5 billion, respectively, of the record high \$11.3 billion U.S. cash receipts from the sale of vegetables in 1989. Vegetable production in California is concentrated near large population centers which are increasingly aggressive in their competition for irrigation water. In Florida, environmental and other concerns are affecting the availability of irrigation water. Both of these States are experiencing increasing water shortages because of drought conditions.

A large portion of vegetable cropland, especially for larger operations, is rented. Increasing urban influence on land values in California, Florida, New York and other States, is reducing the profitability of growing vegetables. Migration of irreplaceable agricultural labor into other occupations during the 1990's is another impending concern. Depending on the resolution of these various problems, new low-cost vegetable growing areas both in the U.S. and in other countries could develop during the 1990's.

#### Multinational Agreements

Although competition from other countries is a constant concern for U.S. vegetable growers, the import share of the U.S. vegetable supply has risen only marginally. On the fresh side, even though Mexico has broadened its market window beyond the winter months and increased the number of vegetables shipped, fresh imports only increased from 5 percent of the total supply in

1980 to 7 percent in 1989. However, fresh-market imports are very important regionally and seasonally, since half the U.S. winter vegetable supply, especially on the East coast, is from Mexico.

Next month's outcome of the 4-year-long GATT negotiations will have a tremendous influence on U.S. vegetable trade during the 1990's. Although prospects for an agreement have dimmed, international standardization of sanitary and phytosanitary measures, significant reduction in EC export subsidies, and other measures hoped for in the agreement would increase competition for the domestic market but would also create many new markets for U.S. vegetable exports.

In contrast, U.S. growers are concerned about the prospects for a U.S.-Mexico free trade agreement, which could be implemented during the 1990's. The biggest effect on increased competition for U.S. growers for a wide variety of vegetable crops where Mexico has cost-of-production advantages. The U.S. vegetable commodities most sensitive to tariff elimination include fresh and frozen asparagus, fresh and frozen broccoli, and fresh artichokes, cauliflower, tomatoes, and carrots. These effects could be somewhat mitigated by a potential snap-back provision and by some small U.S. export gains, particularly for potatoes and dry beans. The effects would be complicated by increased U.S. investment in Mexico. The structure of the U.S. vegetable industry would likely change, as less efficient firms close and larger U.S. firms ship more product from Mexico.

#### Nutrition Labelling

The outgoing Congress has approved a bill which requires retailers to provide nutritional information on the top 20 fresh vegetables and top 20 fresh fruits consumed in the U.S., and gives an interim period for voluntary compliance. FDA is currently preparing the list of nutrients which must be displayed, and is examining other issues for implementing the measure, including how to account for varietal differences in nutritional content. Although retailers have been concerned about the usefulness and cost of this measure, these concerns could be offset by a positive response from the increasingly sophisticated and information-oriented consumer of the 1990's.

Table 1--U.S. production of major vegetables, 1980-91

Year	Vegetables		Potatoes	Dry edible beans	Others 1/	Total
	Fresh	Processing				
Million cwt						
1970	140.1	184.0	325.7	17.4	19.8	687.0
1975	155.9	267.1	322.0	17.4	19.6	782.1
1980	179.4	215.8	303.9	26.7	19.2	745.1
1985	203.5	249.5	406.6	22.3	24.2	906.1
1986	203.2	245.5	361.7	23.0	23.8	857.1
1987	220.5	257.8	389.3	26.0	23.7	917.4
1988	230.5	239.7	356.4	19.3	22.2	868.1
1989	240.4	303.8	370.4	24.3	23.6	962.6
1990f	242.0	325.0	393.2	32.5	25.1	1,017.8
1991f	241.0	315.0	400.0	25.0	25.5	1,006.5

1/ Includes sweetpotatoes, mushrooms, dry peas, and lentils.

Source: NASS (1980-89) and ERS (1990-91), USDA.

Table 2--U.S. per capita use of selected commercially produced vegetables

Crop	1970	1975	1980	1985	1986	1987	1988	1989 1/
Pounds, farm-weight								
Vegetables	176.8	177.7	187.3	195.0	194.4	199.3	199.7	--
Fresh	71.7	74.9	82.3	90.5	90.9	95.4	98.7	101.9
Canning	91.6	89.0	90.6	87.5	87.7	87.1	83.1	--
Freezing	13.5	13.8	14.4	17.0	15.8	16.8	17.9	16.9
Potatoes, all	121.8	122.0	114.3	122.4	125.7	125.9	123.2	126.2
Fresh	62.3	52.6	51.1	46.7	49.4	48.9	51.4	49.8
Canning	2.0	2.0	1.9	1.9	1.8	1.8	1.9	2.0
Freezing	28.1	37.2	35.2	45.1	45.8	47.1	42.6	46.1
Chips/shoestrings	17.4	15.5	16.7	17.7	18.2	17.7	17.3	17.8
Dehydrating	12.0	14.7	9.4	11.0	10.5	10.4	10.0	10.5
Sweetpotatoes:								
Fresh & processed	5.4	5.4	4.5	5.4	4.4	4.5	4.1	4.1
Mushrooms, all	1.3	2.0	2.9	3.6	3.7	3.7	3.6	3.5
Fresh	0.3	0.7	1.2	1.8	1.9	1.9	2.0	2.1
Processing	1.0	1.3	1.7	1.8	1.8	1.8	1.6	1.4
Dry peas & lentils	0.6	0.4	0.4	0.5	0.4	0.4	0.4	0.4
Dry edible beans	6.7	6.8	5.2	7.0	6.6	5.0	6.8	5.5
Total, all items	312.6	314.3	314.6	333.9	335.2	338.8	337.8	--

-- = not available due to loss of stocks data for canning tomatoes.

1/ Preliminary.



Table 3--Vegetable, potato, and dry edible bean prices and indexes, selected years

Item	Units	1970	1975	1980	1985	1986	1987	1988	1989	1990p
<b>Grower prices:</b>										
Fresh	1977=100	56	88	110	122	123	147	137	146	145
Commercial	1977=100	103	164	196	129	130	144	144	156	155
Potatoes	Dollars/cwt	2.21	4.48	6.55	3.92	5.03	4.38	6.02	7.36	6.90
Dry beans	Dollars/cwt	9.21	21.10	27.60	17.60	19.00	16.50	29.80	28.70	20.00
<b>Wholesale prices:</b>										
Fresh	1982=100	55.1	84.5	84.3	100.3	99.4	99.0	100.4	104.2	105.0
Potatoes	1982=100	41.7	75.6	103.3	101.3	104.1	120.1	115.9	153.6	164.0
Dry beans	1982=100	25.7	49.7	81.0	84.8	64.1	78.7	101.5	116.3	100.0
<b>Retail prices:</b>										
Fresh	1982-84=100	39.4	55.6	79.0	103.5	107.7	121.6	129.3	143.1	149.7
Potatoes	Cents/lb	38.0	57.7	19.1	20.8	24.1	27.6	26.1	34.2	36.9
Processed	1982-84=100	36.6	62.2	83.1	104.4	104.2	107.1	112.2	124.2	127.5

p = preliminary.

Sources: MASS, and ERS, USDA and BLS, Dept. of Labor.

Table 4--U.S. trade in selected vegetables, 1990

Commodity	Jan - Mar quarter		Apr - Jun quarter		Jul - Sep quarter		Trade concentration	
	Volume	Value	Volume	Value	Volume	Value	Leading country	Percent of U.S. market
	Mil lbs	Mil \$	Mil lbs	Mil \$	Mil lbs	Mil \$		Percent
<b>Exports:</b>								
<b>Fresh:</b>								
Lettuce	121.1	29	92.9	29	117.5	24	Canada	79
Tomatoes	47.1	22	90.0	22	97.3	24	Canada	94
Onions	66.8	11	50.0	9	87.1	11	Canada	75
Asparagus	14.1	21	22.9	23	1.5	2	Japan	47
Potatoes	49.7	9	141.2	28	107.9	21	Canada	97
<b>Canned:</b>								
Sweet corn	66.6	22	85.4	28	70.9	24	Japan	35
Tomato paste	14.4	7	9.6	4	18.5	9	Canada	78
<b>Frozen:</b>								
French fried potatoes	93.4	30	110.9	35	130.5	42	Japan	58
Sweet corn	31.4	11	36.1	13	38.4	15	Japan	65
<b>Imports:</b>								
<b>Fresh:</b>								
Tomatoes	496.1	315	114.5	26	85.5	15	Mexico	98
Cucumbers	226.3	39	49.4	9	11.0	3	Mexico	92
Peppers, bell	142.6	82	26.9	18	13.4	9	Mexico	85
Onions	167.2	25	132.0	20	27.5	7	Mexico	85
Potatoes	153.8	18	137.2	17	43.6	4	Canada	99
Cantaloupe	222.1	30	236.3	37	6.6	1	Mexico	68
<b>Canned:</b>								
Tomato paste	29.3	11	83.9	32	14.3	5	Mexico	40
Tomatoes, whole	25.3	6	42.2	11	38.2	8	Spain	96
Artichokes	6.0	5	5.5	4	7.8	6	Chile	29
<b>Frozen:</b>								
French fried potatoes	24.0	6	11.8	3	0.0	0	Canada	97
Broccoli	75.0	23	69.8	21	56.1	17	Mexico	94
Green peas	16.9	7	6.2	4	9.8	4	Canada	37

Source: Bureau of the Census, USDC.

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## Intra-North American Trade and Other Trade Issues

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The United States is highly competitive in the production and export of horticultural products, and supplies the world market with a vast array of fresh and processed fruits and vegetables. Evidence of this competitiveness can be found in the consistent growth of U.S. horticultural exports in recent years. During the five-year period from FY 1986 to FY 1990, the value of U.S. exports of horticultural products increased over 50 percent from \$3.4 billion to about \$5.3 billion. In FY 1991, we estimate a further 5-6 percent increase in sales over FY 1990.

Major U.S. horticultural exports include: treenuts such as almonds, walnuts and pistachios; fresh fruits including apples, grapes, cherries, avocados, peaches, pears, grapefruit, lemons, and oranges; dried fruit (principally raisins and prunes); processed potatoes; canned fruit and vegetables; fruit juices and wine. Although the United States normally accounts for less than 10 percent of the value of total world exports in these commodities, recent data indicate that the United States contributes an ever-increasing share of world trade in horticultural products. For some commodities, the United States is the dominant world supplier. For example, the U.S. normally supplies about 70 percent of world almond exports and over 40 percent of the world grapefruit market.

Given the number of products encompassed in the horticultural sector and the wide variety of factors that can affect production and trade in those commodities, it is always highly speculative to estimate overall trends in U.S. horticultural trade. Nevertheless, one area where export growth is forecast in FY 1991 is citrus, where U.S. sales should benefit from a recovery in output from the freeze-reduced crop in 1989. The volume of almond and pistachio exports should also be up due to large crops, although the export value may be affected by declining prices for those commodities. In addition, many U.S. horticultural exports will continue to benefit from improved access as a result of a reduction in import restrictions in several markets. These include recent improved access for many products into Mexico, the reduction in restrictions in Japan on products such as oranges and fruit juices, and prospects for improved access for several items into Korea.

Our success in exporting horticultural products is based on several factors, including the consistent availability of high quality U.S. horticultural products, bilateral and multilateral trade negotiations that have expanded foreign markets, aggressive U.S. marketing efforts, improvements in technology and transportation, favorable worldwide economic conditions, and a growing acceptance of the importance of exports by the U.S. agricultural industry.

Prospects for continued growth are encouraging. There are several reasons why U.S. horticultural exports should remain strong in the next decade.

#### 1. PRODUCTION ADVANTAGES

Although production of most temperate horticultural commodities, such as apples and tomatoes, is geographically widespread, output is also seasonal in nature. Many countries have shifted production of horticultural crops away from widespread, small-scale holdings into large-scale operations on specialized farms that are highly concentrated in areas offering extended production seasons. The United States, one of the world's most efficient agricultural producers, is fortunate to be able to grow a wide range of high quality horticultural commodities that will remain competitive in tomorrow's markets.

#### 2. TECHNOLOGICAL IMPROVEMENTS IN STORAGE AND TRANSPORTATION

Furthermore, international trade for a variety of fresh fruit and vegetables has increased with technological improvements in storage facilities and transportation methods, and the development of new varieties better able to withstand bulk handling and shipment.

#### 3. FAVORABLE ECONOMIC CONDITIONS

U.S. horticultural exports have benefitted from the depreciation of the dollar since 1985. Also, rising incomes in developed and developing countries and changes in diets overseas have contributed to increased demand for U.S. horticultural exports. The trend toward increased exports of frozen and processed fruits and vegetables should also continue as consumers expand their search for quality produce that is also conveniently stored and prepared.

#### 4. MARKET PROMOTION ACTIVITIES AND EXPORT AWARENESS

The Targeted Export Assistance (TEA) program came out of the 1985 Farm Bill and was designed to provide funding to help U.S. farmers counter the adverse effects of unfair trade practices of other countries. Although the 1990 Farm Bill changed the program's name to the Market Promotion Program (MPP), its goals remain essentially the same.



A noteworthy difference between the TEA program and the proposed MPP is that the MPP would allow for expanded eligibility for participants. Unlike the TEA program, where a proven unfair trade practice was part of the criteria for funding, the MPP permits funding for any commodity that can show market potential.

We now have had five years of experience in working with the TEA program, and are confident of its important contribution in furthering U.S. agricultural exports. Under the new Farm Bill, Congress has allocated up to \$200 million per year for the next five years to the MPP. For the first year of the program, FY 1991, Congress allocated \$175 million; horticultural products have traditionally taken a substantial part of this allocation. This financial commitment should continue to facilitate further expansion of U.S. horticultural exports.

Of course, U.S. market promotion activities are only part of the larger picture. Overall, there is a greater awareness among U.S. producers and exporters of the importance of the export market for the U.S. horticultural sector and an ever-greater degree of expertise in developing markets and tailoring U.S. products to foreign consumption habits.

## 5. TRADE POLICY INITIATIVES

The outlook for improved market opportunities for horticultural products in the future also rests on expanded access through reduction of trade-distorting policies. Restrictive trade policies are the single most important barrier to expanding U.S. exports, as is evidenced by the sharp increase in exports of commodities that have enjoyed trade liberalization in specific markets.

The U.S. government has actively worked to improve market access for numerous horticultural products in recent years. Recent successes in negotiating the liberalization of restrictive trade policies have led to significant gains in exports for specific horticultural sectors. Overall future growth rests in large part on a favorable outcome of the ongoing Uruguay Round of GATT negotiations. Should trade liberalization continue, prospects for U.S. horticultural exports will remain bright. Overall, horticultural producers would benefit from the relaxation of trade restrictions, especially in the Pacific Rim countries, where increasing affluence is stimulating consumer demand.

## MARKETS: PAST, PRESENT, AND FUTURE

### INTRODUCTION:

There are several new policy developments that will have a particularly significant impact on horticultural product trade in the future. In the past, U.S. trade policy pursuits have often been focussed on Europe and Asia. Now the U.S. is taking a closer look at home as well. New initiatives include the U.S.-Canada Free Trade Agreement, the Caribbean Basin Initiative, the proposed U.S.-Mexico Free Trade Agreement, the proposed Andean Initiative, and the Enterprise for the Americas.

Above all, the possibility of the elimination of trade barriers on the North American continent will dominate many economic discussions in the coming months. Canada, Mexico and the United States have a combined population of over 360 million. Coupled with the U.S.-Canada FTA, a U.S. Mexico agreement could mean a free trade area with an annual GNP of \$5.5 trillion, surpassing the European Community's combined GNP by over 30 percent. The opportunities and challenges for the U.S. horticultural industry stemming from these developments are far-reaching.

### NORTH AMERICA

#### CANADA

Under the recent U.S.-Canada Free Trade Agreement (FTA), tariffs on U.S. exports to Canada are being reduced annually and will be eliminated by 1998. The U.S.-Canada FTA has already helped both the U.S. and Canada to increase their respective exports. In 1989, the first full year of implementation of the FTA, Statistics Canada figures showed that Canadian imports of U.S. horticultural products increased by 9 percent to \$1.6 billion. U.S. imports of horticultural products from Canada increased 27 percent to almost \$359 million.

According to Canadian data, in CY 1989 the United States provided 91 percent of the value of Canada's total fresh vegetable imports, 74 percent of its fresh fruit imports (excluding bananas), 57 percent of its tree nut imports, and 46 percent of its processed fruit and vegetable imports.

Despite the FTA, changes in either Canadian or U.S. health, phytosanitary or labeling policies could hinder trade between the two countries. For example, on January 1, 1990, the Government of Canada implemented a new regulation requiring grade labeling of all fresh produce shipped in consumer size packages. U.S. exports of several commodities were disrupted numerous times during a period of adjustment. Although Agriculture Canada, USDA and the affected industries worked hard together to minimize the disruptions, this example underscores the reality that health, sanitation, or labeling policies may often restrict trade as much as serve the consumer.

On the positive side, working groups have been created under the FTA and are meeting to discuss some of the outstanding technical issues involving grading, packaging, labeling, and health and phytosanitary problems. Horticultural trade between the two countries should continue to expand as long as these issues do not turn into contentious trade barriers.

During certain time periods, there are relatively high (8 to 12 percent) duties on Canadian imports of many U.S. commodities -- fresh pears, apricots, cherries, peaches, plums, strawberries, tomatoes, onions, Brussels sprouts, broccoli, cabbage, lettuce, beets, radishes, cucumbers, peas, beans, asparagus, celery, mushrooms, sweet corn, and even higher tariffs on many of the frozen forms of these commodities. We should see greater U.S. exports of these commodities in the next several years as the tariffs decrease.

## MEXICO

Mexico is a growing export market for horticultural products. In FY 1990, U.S. horticultural exports to Mexico surpassed \$143 million, an increase of 40 percent from a year earlier. Fresh deciduous fruits were the big winners with exports up by 53 percent to \$29 million. Pears, apples, and peaches accounted for more than half of those exports with sales valued at \$24 million. Although still impeded by relatively high tariffs, almond exports increased from \$2.4 million in 1988 to \$3.4 million in 1989.

The overall growth in exports to Mexico is the result of many factors. In 1986, Mexico joined the GATT and has since significantly lowered tariffs and eliminated import licensing for most horticultural products. U.S. exports have also increased due to Mexico's economic stabilization plan, which has significantly improved the economy.

Although apple acreage in Mexico is projected to continue increasing for the next 3-5 years, the rate of increase will decline. Weather and disease problems have reduced Mexican production of some tree fruits (pears, apples and stone fruit) during the past several seasons. In addition, Mexican deciduous fruit producers are being squeezed by generally high interest rates, reduced input subsidies, limited water supplies and decreased availability of agricultural credit.

All of the above factors point to good prospects for U.S. producers of fresh apples, pears, and stone fruits entering the Mexican market. Mexico's production of these fruits is not expected to increase much in 1990/91 due to the freeze in December 1989 and hail damage in the spring of 1990.

U.S. peach and nectarine exports to Mexico are expected to rise in 1990/91 due to the liberalization of import regulations and because Mexican production has expanded only moderately over the past few years. Permits are required for shipments made between July and October, and a 20 percent tariff must be paid on all shipments.



Mexico is also proving to be a bright spot for U.S. pear producers who have harvested record crops the past few seasons. After Mexico dropped its import permit requirements two years ago, U.S. exports to Mexico have more than doubled and the country has become the number one export market for U.S. pears. Mexican fresh pear imports are subject to a 20 percent tariff. The U.S. pear industry, assisted by the MPP, is developing markets in Mexico which should lead to continued increases in U.S. pear exports. Tight credit and a fungal outbreak in the largest Mexican producing area have reduced planted area and prevented additional pear plantings over the past few years.

U.S. exports of a wide range of other products including raisins, prunes and many prepared foods also registered impressive gains in FY 1990.

#### U.S.- Mexico FTA

In June 1990, the Presidents of the United States and Mexico agreed to initiate negotiations on a possible Free Trade Agreement intended to broaden and strengthen economic relations between the two countries and establish a climate of greater stability and confidence for trade and investment. On September 25, 1990, President Bush formally notified Congress of free trade negotiations with Mexico. Negotiations are expected to begin in the spring of 1991 and an agreement may be signed as early as 1992. Canada has expressed an interest in participating in the negotiations but it is too early to know what type of role it would play.

Overall, the proposed agreement seeks a means to improve and expand the flow of goods, services, and investment between the United States and Mexico. The FTA will look toward the gradual and comprehensive elimination of trade barriers between the two countries, including the full, phased elimination of import tariffs and the elimination or fullest possible reduction of non-tariff trade barriers, such as import quotas, licenses and technical barriers to trade.

Naturally, the prospect of liberalized two-way trade has stirred fears among those in the U.S. horticultural industry who may be particularly vulnerable to a massive reduction or elimination of current U.S. import tariffs on fruits and vegetables from Mexico. Of particular concern are production advantages Mexico possesses including lower labor costs, low costs for social programs, and year-round growing conditions. The United States Government will need to work closely with the U.S. horticultural industry to ensure that rational, equitable adjustments are made as we progress toward a free trade agreement with Mexico.

We anticipate that eliminating these trade barriers will provide a great boost to our export potential in Mexico for many commodities, especially for products that are currently constrained by import quotas or licensing restrictions.



## CENTRAL AMERICA

From FY 1985 to FY 1990, U.S. exports to Central America have climbed from from \$31 to \$50 million. Increases have occurred in sales of fresh fruits and vegetables, processed vegetables, juices, nuts and wine. In FY 1990, substantial gains included fresh non-deciduous fruits, which rose 20 percent from a year earlier to \$9.3 million. U.S. export opportunities to Central America should expand in the next decade as countries such as Costa Rica, Guatemala, and El Salvador, which have now joined or are in the process of joining the GATT, further liberalize their markets.

## SOUTH AMERICA

### VENEZUELA

Venezuela was a significant market for horticultural exports prior to 1982. Then, from 1982 until it joined the GATT, Venezuela maintained a highly restrictive import policy for agricultural goods. On August 31, 1990, prospects again improved when Venezuela became the 98th Contracting Party to the GATT.

As part of its accession package, Venezuela agreed to significant liberalization of trade in agricultural products. Specifically, Venezuela committed: to undertake the progressive elimination of all quantitative restrictions which cannot be justified under the GATT by December 31, 1995; to not increase the scope of protection currently in force, or apply new measures that do not conform with the GATT; to implement a tariff ceiling binding of 50 percent from the date of accession and to lower it to 40 percent in two years; to adopt below-ceiling tariff bindings on roughly 60 items; and to eliminate non-tariff barriers affecting agricultural goods such as apples, pears, raisins and almonds.

## ANDEAN INITIATIVE

On July 23, 1990, President Bush announced a package of new measures for several South American countries in the Andean region. These steps are aimed at providing Peru, Colombia, Ecuador, and Bolivia with long-term economic alternatives to the production and trafficking of illegal drugs. The program will also help to promote their transition into a comprehensive free trade zone for the Americas.

The main elements of the President's Andean package include a special tariff preference regime patterned after the Caribbean Basin Initiative; expanded agricultural development assistance, designed to work toward removing impediments to agricultural production and trade in the region; progress on trade and investment liberalization; and a special Generalized System of Preferences (GSP) review to consider requests from the four Andean countries to provide duty-free entry to specified commodities. Many of the products receiving duty-free treatment are horticultural products. U.S. horticultural imports from the Andean countries in 1989 were valued at \$464 million, of which \$198 million were cut flowers.

These new measures build upon the Administration's "Enterprise for the Americas," an economic partnership with Latin American and Caribbean nations, announced on June 27, 1990. This partnership is designed to encourage economic growth in the Americas by working towards a comprehensive Free Trade Agreement, improving the potential for investment, and providing additional support for debt and debt-service reduction in these countries.

## ASIA

### PACIFIC RIM

The Pacific Rim is the fastest growing region for U.S. horticultural exports. In FY 1990, the region imported \$1.75 billion in horticultural products from the U.S., which places it as the most important region for horticultural exports. Many commodities such as pistachios, grape juice, and citrus products, depend on Asian markets for the majority of their export sales.

The dynamic nature of the Newly-Industrialized-Countries, such as Hong Kong, Singapore, Taiwan and Korea, has fueled the growth of export markets for U.S. horticultural products. Disposable incomes have risen sharply, and along with them, consumer demand has risen for a broad variety of food products.

With burgeoning demand for U.S. horticultural products, the region should provide unparalleled opportunities for exporters. However, many of the most important markets in the region have been characterized by a maze of trade barriers that are designed to allow native industries to grow unimpeded, or to protect inefficient local producers of certain products. Many U.S. export successes are associated with the reduction in these barriers. Assuming these barriers continue to fall, the region provides considerable promise for U.S. exporters of horticultural products. We project continued growth in FY 1991, although probably at a slower pace than during the last few years.

## JAPAN

Japan is the largest overseas market for U.S. horticultural products and the leading export destination for citrus products, cling peaches, raisins, papayas, and several processed vegetables. U.S. horticultural exports to Japan surpassed one billion dollars in 1989. Although the market for horticultural products continues to grow, some trade impediments remain for U.S. exporters. Japan's phytosanitary regulations for many products are especially onerous. However, by working closely with Japanese regulators, the U.S. has opened markets that were previously closed, such as those for walnuts and cherries. The U.S. is a leader in advanced phytosanitary procedures, which has allowed us to capture a large share of many fresh produce markets. One example is the market for papayas, which the U.S. dominates because other producers have not replicated our procedures. Currently, the U.S. government and industry are working with the Japanese government to develop a phytosanitary protocol that would permit entry of U.S. apples into Japan.

Under the GATT-11 agreement, Japan's commitment to eliminate quotas on several horticultural products resulted in dramatic increases in U.S. exports. An example is grape juice where exports doubled in the first year following quota elimination. U.S. orange exports to Japan will enjoy improved export potential when, as a result of the U.S.-Japan Beef/Citrus Agreement, Japan liberalizes its orange market on April 1, 1991. Meaningful expansion, however, will only likely come about if the high Japanese tariff on oranges is reduced in the future. Japan is already the largest market for U.S. citrus, accounting for more than 45 percent of total U.S. shipments.

U.S. grapefruit exports to Japan are another success story. From 1985 to 1989, exports increased more than 150 percent. Over 50 percent of U.S. grapefruit exports, 85 percent of U.S. lemon exports and 30 percent of U.S. orange exports go to Japan.

Under the U.S.-Japan Beef/Citrus Agreement, Japan has committed to liberalize its orange juice imports in April 1992. Although the U.S. stands to gain a substantial share of this market, Brazil will also be a major player.

## TAIWAN

Taiwan is a good example of expanded export opportunities brought about by a long-term shift in horticultural production. In the past, Taiwan was a major producer of canned fruits and vegetables, and was largely self-sufficient in fresh produce. With the rapid industrialization that has taken place there, Taiwan has become one of the best markets for fresh produce in the Asian region. Taiwan's dependence on imports of fresh produce items will continue to expand, with demand increasing for a wider and wider range of products.



To illustrate the market growth, from 1987 to 1988, U.S. exports to Taiwan of fresh plums doubled, grapefruit tripled, and kiwi-fruit quadrupled. In FY 1990, the United States exported over \$184 million worth of horticultural products to Taiwan. This amounted to over 7 percent of the total of all fresh fruits and vegetables exported by the United States.

The leading fresh fruit and vegetable products exported to Taiwan have been apples, grapefruit, plums, and table grapes. In fact, Taiwan is the number one overseas export market for apples, and accounts for 19 percent of all U.S. apples exported. Taiwan also is the leading destination for fresh plum exports, accounting for 43 percent of the total in FY 1990.

Even though the market is well established for some horticultural products, there is room for expansion, as well as for the introduction of new items. In addition, there are great opportunities for many other items. Exports to Taiwan in FY 1990 showed impressive gains over FY 1989 sales for many fresh produce items, including fresh plums (up 93 percent), oranges (120 percent), table grapes (26 percent), nectarines (104 percent), kiwifruit (65 percent), lettuce (40 percent), and celery (62 percent). U.S. pear sales to Taiwan rose from non-existent in 1988 to \$1.4 million in 1990.

## KOREA

Much effort by U.S. government and private organizations has been spent on gaining and maintaining access to the Korean market. Despite the difficulties, a look at U.S. export data to Korea shows that progress is being made and that the effort is well worth the cost.

Korea maintains a number of tariff and non-tariff restrictions on horticultural imports. Korea's import tariffs on fresh fruit and nuts range from 30 to 50 percent. Korea currently allows imports of lemons, grapefruit and several other items and imposes a restrictive quota on orange juice. Under the May 1989 U.S.-Korea Agricultural Agreement, Korea has agreed to liberalize imports of a number of products in January 1991, including walnuts, hazelnuts, melons, and canned peaches. Furthermore, in November 1989, Korea agreed to phase out, or bring into conformity with the GATT by 1997, all remaining restrictions on products including apples, oranges, pears, peaches, grapes, apple juice, orange juice, and grape juice. The phase-out will take place in two 3-year programs, beginning in March 1991.

As the tariffs and quotas are removed, food safety, phytosanitary, and customs classification issues are becoming the foremost barriers to trade. In the last year, imports have been denied entry or destroyed for myriad "technical" reasons: alleged alar on grapefruit, vegetable oil on raisins, food additives (considered safe in the U.S.) in olives, and maraschino cherries; different packaging of identical products; and bacteria on frozen potatoes (discovered at retail point). Whenever the U.S. believes it has exhausted the possibility for "technical" solutions to these issues, the U.S. will continue to apply pressure at the political level.



The May 1989 U.S.-Korea Agricultural Agreement removed pecans from import licensing restrictions on January 1, 1990 but Korean plant health regulations prohibited the import of both pecans and strawberries (also liberalized in 1990) because of codling moth. Although the U.S. has demonstrated to Korea that neither pecans or strawberries is a host to codling moth, several shipments of U.S. pecans were destroyed by Korean customs for phytosanitary reasons. Recent information, however, indicates that the Korean government intends to relax this restriction and permit imports of pecans in the near future.

Codling moth may also prevent shipments of U.S. walnuts, which are due to be liberalized on January 1, 1991. USDA is now working to demonstrate to the Koreans that we have effective measures in place which will ensure that the codling moth does not enter their country via walnuts, similar to systems in place that are accepted by other codling moth-free countries.

On the positive side, the U.S. government has made some progress on other issues such as labeling and exchange of information on inspection programs.

#### INDONESIA

The U.S. and Indonesia have been conducting ongoing discussions under the GATT to remove Indonesia's import licensing restrictions on a range of bound agricultural products, including fresh citrus. While this move is a step in the right direction, the United States will continue to push for complete liberalization of all bound items. Indonesia currently has a tariff on fresh citrus of 30 percent.

#### PHILIPPINES

In FY 1990, the Philippines imported \$1.5 million of fresh citrus from the U.S. However, in August 1990, the Philippines banned imports of fresh fruit from California due to concerns about the fruit fly infestation. Following the recent announcement that California was declared free of Medfly, the United States has requested that the Philippines end its ban on fresh fruit imports. The Philippine tariff on fresh fruit is 50 percent.

Additionally, the current severe foreign exchange shortage recently led to a temporary ban on imports of non-essential items such as fruit. Recent reports indicate this ban is being relaxed for most commodities.

## THAILAND

Thailand imposes high tariffs (often in excess of 60 percent) on most horticultural products in order to protect local production. Potentially, it could be an important market for U.S. fruits and vegetables with a relaxation of these restrictions. An example of the effects of tariff liberalization in Thailand is the recent reduction of the Thai import duty on apples from about 100 percent to about 10 percent. U.S. apple exports increased \$3.2 million in FY 1988 to over \$8.7 million in FY 1990.

## AUSTRALIA

Australia, like California, has fresh strawberry production that lasts almost nine months of the year. However, the times of the year do not coincide, and California exporters have found Australia to be an excellent market in March through May, which corresponds to the first big wave of strawberry production in the state. By seizing this opportunity, California fresh strawberry exporters have increased their sales to Australia from \$36,000 in 1987 to \$2.5 million in 1989. This market has provided an outlet for U.S. strawberries at the time of the year when domestic supplies are high, and prices depressed.

## EUROPE

### EUROPEAN COMMUNITY - 1992

The European Community (EC) traditionally has been one of our largest markets for horticultural products. The important changes taking place as the EC approaches the status of a single market will certainly affect its trading status in the global arena.

Over the past year, the EC has made considerable progress in realizing its goal of creating a single internal market. The majority of market directives related to horticultural trade concern harmonization of phytosanitary measures. The remainder concern food safety and processed food legislation.

Our major concern is how the ultimate removal of border controls within the Community will affect our trade. Although it is still early to predict the overall effect of EC 1992 on U.S. horticultural trade, exporters should benefit from harmonized standards and access through one border (rather than twelve). However, harmonization of EC standards will only improve access if those standards are reasonable and based on sound science, in line with the EC's commitment in the Uruguay Round.

## EC MARKETS

U.S. cherry growers created new business for U.S. fresh sweet cherries by taking advantage of a small marketing window in Germany, Holland, Belgium and France. While these target markets each produce fresh, sweet cherries, exporters believed that a market niche for U.S. cherries could be created by selling after the domestic production had disappeared from the market. Building on the sales connections made during the 1990 season, business in the EC should expand greatly during coming years.

Almond exports to the EC were valued at \$274 million in FY 1990, which accounted for 52 percent of all U.S. almond exports. Nearly half of this amount is targeted for Germany alone, which makes Germany the single largest market for California almonds.

The California walnut industry was successful in raising export levels to an all-time high in FY 1990. In the United Kingdom, the value of walnuts jumped 60 percent from FY 1989 to FY 1990.

The EC has been a major growth market for grapefruit and today it is the second largest market for U.S. grapefruit, accounting for nearly 30 percent of U.S. exports. U.S. grapefruit exports to the EC increased from 52,000 tons in 1985 to nearly 140,000 tons in 1989.

## NON-EC EUROPE

The U.S. has also developed important markets for several specialty commodities in non-EC members. The U.S. government has worked closely with the U.S. apple industry to develop a significant market for U.S. apples in Scandinavia through the reduction of tariff and licensing restrictions.

U.S. walnut exports have recently expanded significantly into the Austrian market. In FY 1990, the volume of in-shell walnut exports to Austria increased 90 percent, from a year earlier.

## EASTERN EUROPE

Eastern Europe's recent market reforms mean farm and food enterprises will have to be responsive to consumer demands. Thus, the potential for new markets for U.S. horticultural products deserves a close look.

By the close of 1990, Eastern Europe (excluding the USSR) will translate into a potential market of over 100 million people. However, near-term prospects for U.S. horticultural products appear dim as the region as a whole is constrained by slow growth, inflation, hard currency shortages, low disposable incomes and inadequate infrastructure. Furthermore, the European Community has the advantage of close proximity and Eastern Europe already produces an abundance of fruits and vegetables.

Horticultural commodities that do hold promise are those which Eastern Europe does not produce such as nuts (especially walnuts and almonds), canned fruits, dried fruits (especially raisins), exotic fruits, and citrus fruits and juices for upscale markets and hotels.

The MPP program could make promotional funds available for specific commodities in Eastern Europe. Promotional activity could take various forms, including market research, but trade servicing and point-of-sale contact with consumers could be particularly effective in the East European countries considering their years of isolation.

#### CONCLUSION:

Export markets for horticultural products are constantly changing, with new opportunities being discovered all the time. U.S. exporters must continue to be on the look-out for opportunities based on temporary shortfalls in non-traditional markets, or long-term shifts in production. To remain competitive, U.S. exporters will also have to remain on the cutting edge in developing technology to reduce production and marketing costs. Further, they will have to remain increasingly responsive to the diverse cultures and product demands of consumers in foreign countries.

The outlook for continued growth in horticultural exports is favorable. On the whole, markets for horticultural products are opening, not closing. The U.S. government, working hand-in-hand with interested industry representatives, has played a major role in reducing obstacles to overseas access for U.S. horticultural products. It is to the credit of the U.S. industry that U.S. producers and shippers have been quick to recognize and take advantage of these new opportunities.

The U.S. Government continues to be concerned about the level of impediments to U.S. horticultural exports. But working closely with U.S. industry, we are confident that a strong consistent attack on barriers to U.S. horticultural exports will lead to further expansion of market opportunities in the future.



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## FRUIT AND VEGETABLE INDUSTRY PERSPECTIVE

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The day after the November 6 elections in California, a distinguished panel of agricultural marketing and policy experts were asked if it was going to be "business as usual" in the fruit and vegetable industry, now that "Big Green" had been defeated.

Their resounding, unanimous reaction was "never again".

Although it is just one issue, it is indicative of an industry at the crossroads. Fruit, vegetable and nut producers in the United States are going to be competitive, and therefore successful in the years to come, only if they stay a step ahead of the sweeping changes that are occurring around the world that affect, not only their businesses, but their customers and competitors, as well.

Unfortunately, today, being competitive in the fruit and vegetable industry doesn't necessarily mean being the best farmer, or the most savvy businessman, or even the most innovative marketer. Producers also have to be able to anticipate the changes and challenges facing the industry and structure their operations accordingly. Producers have to adjust to the changing demographics of the marketplace, as well as the changing nature of their industry.

They must cope with the increased cost associated with complying with ever-increasing numbers of laws and regulations being passed at the state and federal level. They must face the food safety issue head on with an offensive, pro-active strategy and, they must build a strategy that will make their commodities competitive in a world market, not just a regional or domestic marketplace.

### Changing Marketplace

You can't just grow, pack, and ship fresh produce anymore: you have to creatively market it as well. The most successful producers today in the fresh produce industry are those that have seized marketing opportunities through creative use of branding, varietal promotion and niche marketing, both domestically and internationally. And to stay successful, these companies will need to be even more creative and sophisticated in the future.

What affect will major shifts in the U.S. population have on the fruit and vegetable industry in the 1990's? Who will be buying fruit and vegetables at the end of this decade? It's a safe bet that the consumer of 1970 or 1980 will bear little or no resemblance to the consumer in the year 2000.

Earlier this year at a leadership symposium sponsored by The Packer, a fresh produce industry trade journal, and the Produce Marketing Association, produce industry leaders from around the country sat down to discuss these kinds of issues.

Their discussions were edited and published in Visions For The 90's by The Packer.

They found that America is aging, and that's good news for the fruit and vegetable industry. Research indicates that older americans are the biggest consumers of fruit and vegetable products. Americans' push for health and fitness is also good news for the industry.

But, not only is America aging, its face is changing as well. Its ethnic diversity is growing by leaps and bounds. According to Vision For The 90's, the 1980's saw the greatest influx of immigrants since the 1900 - 1910 growth period. The biggest source was immigrants from Mexico. In fact, more immigrants came from Mexico than from all of Europe combined.

Visions correctly pointed out that produce marketers in the 90's cannot be blind to current changes and challenges in these population shifts. Micro marketing and target marketing will be the foundation of successful marketing efforts of the 1990's. And, while the primary challenge will be faced by those at the retail level who directly sell fresh produce to these consumers, the successful producers will be those who package and market their commodities to fit the demographics of the marketplace.

#### Managing Costs

Our panelists this morning have described the fruit and vegetable industry as strong, resilient, multifaceted, diverse and efficient. It has to be to survive.

In order for a fruit and vegetable operation to be competitive in the increasingly global marketplace, it is essential that all these adjectives apply. otherwise, their viability is unquestionably short-term.

But the outlook for the domestic industry's competitiveness in the 1990's is becoming somewhat cloudy. The cost of doing business has spiralled upward in recent years and will continue to rise in the foreseeable future.

These increased costs, combined with wildly fluctuating market prices for a variety of fruit and vegetable commodities, make the produce industry a game of survival of the fittest.

To give you some perspective, let's take a quick look at what's happened in the California and Arizona lettuce industry over the past year.

Production costs for iceberg lettuce include land preparation, growing costs, harvesting, marketing and selling. The Cooperative Extension of the University of California projects that the total cost of producing lettuce in the Imperial Valley 1989-1990 growing season was \$2920.70 per acre, or \$5.84 per carton, based on 500 cartons per acre.

That \$5.84 per carton cost breaks down to \$1.08 for land and land preparation, \$1.36 for growing costs, and \$3.40 to harvest, market and sell. Obviously, these costs per carton change depending on the yield per acre. If the yield is 700 cartons per acre, the per carton cost is \$5.14; 900 cartons per acre, \$4.76 per carton. That's below the cost of production.

Looking now at the F.O.B. prices for iceberg lettuce for the past fifty-two weeks, ended November 4th, the low was \$2.60 and the high was \$12.50. - The average weekly F.O.B. price for the period was \$5.75.

As a producer, your ability to weather this market depends entirely on your timing: In other words, did your volume coincide with the peaks or the valleys of the market? For example, if you were shipping during the first three months of this year, your average F.O.B. price was \$3.78 per carton. If, however, you were fortunate to be shipping August through October, the average F.O.B. price was \$9.50 per carton.

Your ability to be profitable also, obviously, depends on your actual costs of production. For example, if you owned the land you farmed, you did better than your neighbors who leased.

Markets such as these have been a driving force behind the diversity that has occurred in the industry and mentioned here this morning. Diversity is crucial, not just in the commodities produced, but where they are produced, as well. It is the economic need for this diversity that has spawned the consolidation of the fruit and vegetable industry in recent years, as the larger companies look for production opportunities in different commodities and geographic locations. What effect continuing consolidation at both the production and retail level will have on the markets is best left to the economists, but many in the industry believe it will lead to further market instability, at least in the short term.

### The Food Safety Dilemma

Another issue that is raising the costs of doing business in agriculture, and in which we cannot operate business as usual, is the food safety arena. Several of our panelists have mentioned this issue this morning. Its importance is underscored by the fact that an entire session will be devoted to it tomorrow. The food safety issue has been, and continues, to be used as a competitive marketing strategy. Food safety and people's fears over pesticide use are being used by organizations, businesses, and politicians to further their own agendas, profits, and political careers. We saw a prime example of this recently in California when, first, Attorney General and Gubernatorial candidate John Van de Kamp and, later, State Assemblyman Tom Hayden pinned their political hopes on the falling star of proposition 128, or Big Green as it was known.

However, as a competitive marketing strategy, the food safety issue will disappear when a juicier topic comes along. More and more, as we receive calls from reporters and consumers, we're noticing fewer calls directly about pesticide use, as the body of scientific information available is substantial, but we're receiving more questions about water use by growers, or more general environmental topics.

However, this doesn't mean that we simply can turn away from the issue and pretend it doesn't exist. Even if the subject grows cold, the doubt has been raised in the consumer's mind and one tragic scare could trigger a panic or overreaction.

Collectively, the fruit and vegetable industry has taken a proactive approach to educating consumers, reporters, opinion leaders, industry members and government officials about the realities of pesticide use in agriculture. We look to science for our facts and figures, and directions.

We will continue to communicate our message, over and over again, until it makes headway in influencing public perception. Science, not conjecture or emotional interpretation of the facts, must govern the public debate over food safety.



A look at what is happening in our country demographically helps to explain why we are in the midst of the food safety controversy. Fewer people live and work on the farm today. Urbanization has left the public knowing less about agriculture and how food gets to the table. So, they are easier victims of exaggerations and misstatements.

We in agriculture know that farmers truly care about the safety of the food supply, their workers, the air and water, and their families. After all, farmers are the original environmentalists. If they don't take care of these resources, then they're out of business and so are their sons and daughters, and grandchildren.

Growers are reducing the use of pesticides where possible. They're utilizing integrated pest management, or IPM advancements. They use natural biological means of control and selective uses of pesticide materials when absolutely necessary. These chemicals cost money, and in an increasingly competitive climate in the '90s, growers must cut their costs whenever feasible.

Unfortunately, another fact is that taxpayers, for the most part, are unaware of all our government is doing to monitor pesticides and protect the food supply. They don't know that the USDA, EPA, FDA, and a myriad of individual state regulatory agencies all have a hand in ensuring the food supply is safe.

The key to dealing with the many false perceptions that have created this issue will be education.

We must redouble our efforts to educate the public about what the government does to monitor their food, the extensive precautions farmers take to provide safe food, and about food preparation and nutrition to promote longer and, hopefully, healthier lives. This is the task before the food production industry.

### The Global Marketplace

The final competitive factor affecting the fruit and vegetable industry I'd like to talk about this morning is international trade.

No other segment of U.S. agriculture has been more supportive of the Reagan, and now Bush, Administration goal of liberalizing world agricultural trade than the fruit and vegetable industry in this country.

Fruit and vegetable producers and their organizations have strongly backed the Administration and its Uruguay Round proposals since the current multilateral trade negotiations began four years ago.

There are many reasons for the industry's steadfast support. But the most important is that fruit and vegetable producers have no target prices, receive no deficiency payments, or export subsidies. For better or worse, they operate entirely on a free market basis.

As a result, the industry feels it has a great deal to gain from an agreement that would eliminate the trade-distorting internal support measures, export subsidies, and market access barriers utilized by its competitors around the world.

The United States' July, 1987, proposal called for the total elimination of these trade-distorting measures over a period of ten years.

The fruit and vegetable industry strongly supported this approach and viewed it as an effort to establish a global free trade agreement for agriculture. Quite frankly, most of us in the industry were extremely concerned when the United States backed off its position of total elimination, and subsequently agreed to pursue a percentage reduction.

Nevertheless, in our opinion this multilateral approach is the only way to negotiate the removal or reduction of subsidies, tariffs and market access barriers in agriculture.

The alternative, bilateral approach will only result in the development of massive trading blocks that will entrench in their own markets. We've seen it happen already in Europe, and now we're seeing the beginning of one in North America.

That brings me to the next issue: A proposed free trade agreement between the United States and Mexico.

Let's paint this scenario:

If the agricultural negotiations breakdown and the United States fails to achieve its goals in the Uruguay Round, and, if the United States and Mexico successfully negotiate a comprehensive free trade agreement, the fruit and vegetable industry in this country as a whole will be the big loser. We simply cannot afford to trade away access to our markets and not concurrently be successful in breaking down barriers to new markets for our products around the world. The two must go hand in hand.

Many fruit and vegetable producer organizations around the country have announced their opposition to the proposed free trade agreement with Mexico. From an economic standpoint, the Mexican fruit and vegetable industry has for years demonstrated that it's quite competitive in the United States marketplace. Their success in penetrating the U.S. market and picking up market-share on a variety of fruit and vegetable commodities is evidence of their abilities.

The reason behind Mexico's strong competitive position in the United States is quite simple. Labor costs there are about ten percent of what they are here in the United States.

In addition to substantially higher labor costs, producers in the United States also are saddled with a whole host of laws and regulations that are not faced by producers in Mexico. Growers in Florida, California, Arizona, Texas and other states find themselves faced with state and local growth management regulations, federal and state environmental laws and regulations, ground water management restrictions, and strict labor laws at all levels of government.

Each of these, at each level, is accompanied by considerable costs that must be absorbed by the producer. Our federal and state lawmakers pass these laws to improve the standard of living and working conditions for American citizens.

Unfortunately, the irony is that the result is to encourage production outside of the United States. With the production goes the jobs and the ability to control labor and environmental issues. If we continue to adopt policies in the country that encourage the importation of food, rather than the production of it, we are certainly opening up ourselves to food being used as a weapon against us in the future.

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## OUTLOOK FOR TOBACCO

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The outlook for tobacco in the early 1990's has improved somewhat from that of the mid-1980's. Supply and demand are largely in balance; surplus stocks have been virtually depleted. Cigarette production is rising because of phenomenal growth in cigarette exports. Still, the industry faces continued declines in U.S. consumption of most tobacco products, heightened antismoking activity, declining social acceptance of tobacco use, a greater number of more stringent restrictions on tobacco use and higher federal, state, and local taxes.

Looking ahead two to three years, the outlook remains bright. Cigarette production is up in 1990 and further increases are likely because of the growth in exports in the Far East, the Soviet Union, and prospects for sales to East European countries. On the other hand, domestic cigarette consumption continues to fall. Furthermore, the rate of decline has increased and may average 3 percent or more during the next several years. Leaf exports may rise, but they continue to face obstacles. The key question, looking 5 years ahead, is whether cigarette exports can continue to grow enough to offset declines in domestic consumption. A number of unknowns cloud the picture.

The U.S. tobacco outlook for 1990/91 is highlighted by sufficient supplies overall, but shortages are developing. Compared with a year earlier, U.S. flue-cured prices are about unchanged, but burley prices are higher. Flue-cured prices changed little despite increased support levels because the crop was larger and quality was down in southern North Carolina and in South Carolina. Burley prices are up because of higher supports, tightening supplies, and a relatively good-quality crop.

After rising in 1989/90, use will do well to hold its own in 1990/91. U.S. production in 1990 is up about 17 percent from last year. However, despite larger production, lower carryin stocks reduced supplies about 2 percent to 3.9 billion pounds, with decreases in nearly every type.



The size of the 1991 crop will depend in part on USDA's decisions on quotas, which must be made by December 15 for flue-cured, February 1 for burley, and March 1 for other kinds. The shortening supply and underproduction of burley in recent years suggests that the basic quota might be raised. Flue-cured supply and demand are about in line, but the flue-cured quota may increase, even though the formula requires a small decrease in stabilization holdings. However, the key for both flue-cured and burley is the level of manufacturer's buying intentions. Effective quotas could rise for burley, but fall for flue-cured.

Production of all tobacco may change little next year if yields are average. Prices in 1991 are difficult to predict, but depend heavily on the quality of the crop and the level of domestic and foreign demand for cigarettes.

### U.S. Cigarette Sales Declining, Exports Up

Cigarettes are the dominant product of the tobacco industry in the United States and most other countries. With an increase in exports, U.S. output may rise to 700 billion pieces this year, about 23 billion above 1989. However, U.S. cigarette consumption may fall about 3 percent this year. Consumption per person 18 years and older in the United States may drop by 114 cigarettes (6 packs of 20) from 2,926 to 2,812. This would be the lowest since 1942 and 35 percent below the 1963 peak. During the 1970's cigarette smokers shifted toward low-tar brands. However, there was a reversal after 1980. From 1981 to 1985 the low-tar proportion (15 milligrams of tar or less) fell, but it rose for three consecutive years to about 56 percent in 1988 before declining to 55 percent last year where it may remain this year.

Despite an increase in the smoking age population, total consumption of cigarettes is likely to decline again in 1991 and per capita consumption is also likely to decline. Price hikes because of increased manufacturer's costs and to maintain or enhance profits together with tax increases are primary among reasons for the expected decline in both total and per capita consumption. The Federal excise tax has remained at 16 cents a pack of 20 since 1983, but 9 States raised taxes an average of 8 cents a pack in 1990. State taxes now vary from 2 cents a pack in North Carolina to 41 cents in Texas.

Sixteen States now levy excise taxes of 30 cents a pack or more. The combined city, county, and State tax is 56 cents in Chicago, Illinois. Further State tax increases will occur in 1991 and the Federal excise tax is scheduled to rise 4 cents to 20 cents a pack on January 1. Federal excise taxes on cigars, chewing tobacco, snuff, and pipe tobacco also go up 25 percent on January 1.

Wholesale cigarette prices rose in December 1989 and again in May and November this year. A further increase will occur in January, 1991. For the 7 years prior to 1990 manufacturers raised wholesale prices 3 to 6 percent at about 6-month intervals. They increased 10 percent between December 1989 and November 1990. Retail prices rose 10 percent between October 1989 and October 1990 and

have risen 6 to 13 percent a year and at a faster rate than overall consumer prices the last several years. As prices have risen, sales of generic and value-priced cigarettes (priced 15 to 35 percent lower than standard brands) have risen and now account for between 15 and 20 percent of U.S. cigarette sales.

Antismoking activity, including legislation, continues to affect the industry. Forty-six States and the District of Columbia have laws that either prohibit smoking in certain places or segregate smokers and nonsmokers. Seventeen States regulate smoking in the workplace of both private and government employees, and thirty-one States regulate smoking in government workplaces. The U.S. General Services Administration (GSA) has implemented stringent smoking restrictions in buildings it owns and leases. Also, a large number of towns and cities have smoking restrictions. The U.S. Department of Health and Human Services and voluntary health agencies have stepped up efforts to discourage smoking. The cumulative effect of publicity and ordinances on smoking is uncertain, although it almost surely accounts for some of the downward trend in per capita consumption.

The "Omnibus Budget Reconciliation Act of 1990" increases U.S. Federal tobacco excise taxes. The federal cigarette excise tax is scheduled to go up 4 cents to 20 cents a pack of 20 effective January 1, 1991. The tax will be boosted another 4 cents to 24 cents a pack January 1, 1993.

A number of bills were introduced in the 101st Congress that could have affected cigarette smoking. Most were bills that were first introduced in previous sessions. They included: 1) increasing the Federal excise tax on cigarettes--most would have increased it by more than the amount agreed upon in the budget deficit reduction package; 2) banning all cigarette advertising; 3) eliminating cigarette advertising as a deductible business expense; and 4) adding additional warning labels to the four currently rotated on cigarette packages indicating the addictive nature of nicotine. Similar bills are likely to be introduced in the 102nd Congress.

#### Changes in Tobacco Per Cigarette Affect Total Use

Tobacco use in cigarettes remained relatively constant during the 1970's and in 1980 and 1981, despite the gain in cigarette output. For many years, manufacturers could economize in leaf use as they shifted to filtertip brands and used the whole leaf. Later, manufacturers began using various leaf expansion processes and in recent years have used more imported tobacco to stabilize costs. With cigarette production declines from 1981 to 1986, total tobacco use fell, but hikes in 1987 and 1988 have boosted leaf use. Leaf use fell in 1989, but may rise in 1990 because of another increase in cigarette production.

U.S. cigarette manufacturers used an estimated 1,141 million pounds of tobacco (unstemmed processing weight) in cigarettes in 1989. This was about 5 percent below 1988 as total cigarette production fell and leaf use per cigarette

dropped. This calendar year, with cigarette output rising perhaps 3 or 4 percent, manufacturers may increase their total leaf use.

Manufacturers used an estimated 1.68 pounds of tobacco (unstemmed processing weight) per 1,000 cigarettes produced in 1989, about 2-1/2 percent below a year earlier, and considerably below the levels of 15 to 20 years ago. Domestic flue-cured accounts for about 38 percent, burley 28 percent, and Maryland 2 percent. Foreign grown was 32 percent; fifteen years earlier it was 15 percent.

#### Consumption of Other Products Mixed

Consumption of large cigars will likely decline about 4 percent to 2.4 billion in 1990. Production of little cigars--less than 3 pounds per 1,000-- may decline for the second consecutive year. Large cigar consumption in 1990 is expected to continue the decline that started in 1970.

Consumption of chewing tobacco probably continues to be hurt by price hikes, publicity against smokeless products, and legislation enacted in the 1980's. The legislation requires rotating warning labels on product packages, a ban on radio and television advertising, and imposes a Federal excise tax on chewing tobacco.

Snuff consumption may have risen in 1990. An increase in moist consumption is more than offsetting a decline in dry snuff. Snuff consumption may rise again in 1991.

The factors listed above for chewing tobacco also apply to snuff, but after falling for two years, snuff consumption has risen for three consecutive years. The hike in snuff use in 1988, 1989, and 1990 may be the result of consumers substituting snuff for smoking as the number of restrictions on smoking grows, stable employment in industries where workers typically use smokeless tobacco, effective industry promotion of snuff products, and possibly the waning of the impact of warning labels, tax hikes, and antismokeless tobacco use publicity.

#### World Situation

World tobacco production in 1990 is estimated at 15.3 billion pounds (farm sales weight), down 2 percent from 1989. The smaller 1990 production is mainly due to reductions in Brazil, China, India, Turkey, and Italy. Production may be higher in the United States, Greece, and Bulgaria.

Of the cigarette types compared with 1989, production of flue-cured is lower in all the major producing countries, but the United States. Burley production is up in the United States, Italy, and China more than enough to offset reductions in Mexico, Brazil, Argentina, and South Korea. Oriental

production is down. The big drop in Turkey more than offsets increases in Greece, Bulgaria, and Yugoslavia.

Production of other types is mixed. Production of dark-air- and sun-cured, light air-cured, and dark air-cured cigar tobacco are down whereas production of dark fire-cured is up.

World cigarette production in 1989 reached 5.4 trillion units, or 1-1/2 percent above a year earlier. Although consumption is stagnant or declining in the United States, Western Europe, Canada, and Japan, increased consumption in China will keep annual production changes positive for the world. In 1989, China's cigarette production was 1.65 trillion pieces, 3 percent above the year earlier.

Despite China's continued annual growth, stagnant consumption in the industrialized nations will likely slow the increase in cigarette output in future years.

World leaf exports during 1989 rose 2 percent to 3.1 billion pounds. Leaf exports in 1990 are expected to rise further. U.S. leaf exports were up 3 percent in 1989. The hike in U.S. exports last year reflects larger 1989 marketings of relatively good quality and a rebuilding of stocks in countries such as Japan and Taiwan. U.S. leaf exports through September are below last year, but calendar 1990 exports may exceed those of last season. Zimbabwe also may export more tobacco in 1990 but Brazil may reduce exports because of smaller plantings and unfavorable exchange rates.

#### 1990 Legislation

On November 15 the "Farm Poundage Quotas Revisions Act of 1990" was enacted (P.L.101-577). The law permits sale of burley poundage quotas within counties beginning with the 1991 crop year. The purchaser must be an active burley grower and the purchase is annually limited to no more than 30 percent of the existing quota of the buyer's farm or 20,000 pounds, whichever is greater. Also, a farm that purchases quota is not permitted to sell any quota within three years of the last year of purchase. The total tobacco acreage permitted on a receiving farm cannot exceed 50 percent of the total cropland in the farm. Sale of poundage quotas have been permitted for flue-cured since 1982.

The law also tightens requirements for use of quota to keep from losing it, and limits the amount of quota that can be divided, known as farm reconstitution, to 1,000 pounds (except when the division is among immediate family members or pursuant to probate proceedings). The law also increased the amount that can be leased to a receiving farm from 15,000 to 30,000 pounds thereby permitting individual farms to lease in the larger amount. Also, the law authorizes lease and transfer across county lines in Tennessee if a majority of active Tennessee burley producers favor in a referendum.



Under the "Omnibus Budget Reconciliation Act of 1990" signed into law on November 5, 1990, for 1991-95 crop years tobacco growers and purchasers of tobacco under marketing quota will annually be assessed one percent of the national loan rate on all marketings (one-half percent each for growers and purchasers). The assessment is intended to cover the costs of administering the tobacco price support-production control program. This amounts to 1-1/2 to 2 cents per pound of tobacco sold.

The 1990 Farm Bill ("The Food, Agriculture, and Trade Act of 1990") was passed by the U.S. House and Senate in October. It includes two provisions affecting tobacco that:

- o Require all exporters of tobacco leaf and products to report information about export sales no later than 60 days after the shipment to the Secretary of Agriculture. Information about the type and quantity of tobacco exported, marketing year of shipment, country of origin, and destination is required.
- o Authorize the Secretary of Agriculture to invest trust fund reserves from the imported tobacco inspection account in insured or fully-collateralized interest-bearing accounts or, at the discretion of the Secretary, by the Secretary of Treasury in the U.S. Government debt instruments. Fees, charges, and interest earned from the investment of each fund would be added to the applicable appropriation account and be available without fiscal year limitation. Interest earned would be used to offset imported tobacco inspection fees.

#### U.S. Tobacco Crop Larger

Tobacco production is up this year because of larger acreage and yields. Despite higher price supports, flue-cured auction prices were about the same as a year earlier. Still, because of larger production flue-cured cash receipts from the 1990 crop were up about 9 percent. Production costs were higher, but the no-net-cost assessment charged producers was unchanged at 1 cent.

Under the Budget Deficit Sequester order, 1990 crop tobacco loans to producer associations are subject to a reduction of 1.4 percent. So that the effective loan rate would not be reduced, the Flue-Cured Stabilization Cooperative decided to use its reserve funds to make up the difference (2 cents per pound). Any tobacco that went under loan received the full loan rate. The two burley cooperatives elected to have warehouses deduct the 1.4 percent, or about 2 cents a pound.

As of November 1, the tobacco crop was forecast at 1.6 billion pounds, up 17 percent from a year earlier. Total supplies for the 1990/91 marketing year were down about 2 percent as reduced carryin more than offset increased production.

Price supports for all kinds of tobacco are higher this season. Burley auctions opened November 19. Prices this season are averaging above a year earlier. Cash receipts for the 1990 burley crop may increase 15 to 20 percent.

As of October 1 this year, grower cooperatives held about 430 million pounds of tobacco (farm sales weight), down about 20 percent or 110 million pounds from a year earlier. Unsold loan stocks of about 310 million pounds on October 1 were down about 32 percent from a year earlier. The reduction came about because of special ("buyout") sales authorized by 1986 tobacco legislation, tightening supplies, and lower takings of burley and flue-cured by cooperatives in recent seasons.

Under buyout provisions, manufacturers agreed to buy approximately 584 million pounds (farm sales-weight) of 1976-84 flue-cured tobacco over an eight year period and about 308 million pounds of burley (farm sales-weight) over a five year period. By the beginning of the fifth year, all burley stocks were sold. The flue-cured buyout is well ahead of schedule with about 86 percent of eligible stocks sold and over 3 years of the buyout period remaining.

The flue-cured auction season ended on November 15 with prices averaging \$1.67, virtually the same as last year. About 75 million pounds were placed under loan, considerably more than last season and the highest in four years. Still, loan takings were considerably below placements in the 1980-86 seasons.

Government price support is mandatory for tobacco produced under marketing quotas. Support levels for 1991 have not been set although preliminary figures indicate the flue-cured support will increase between 3-1/2 and 5-1/2 cents a pound.

Flue-cured and burley price supports are the level for the preceding year adjusted by changes in the 5-year moving average of prices (two-thirds weight) and changes in the cost of production index (one-third weight). Costs include general variable expenditures, but exclude costs of land, quota, risk, overhead, management, marketing contributions, and other costs not directly related to the production of tobacco.

Marketings from the 1990 flue-cured crop and unsold 1989 production were about 10 percent above last year's marketings. But, with a smaller carryover, flue-cured supplies for 1990/91 are about 1-1/2 percent below last season. The flue-cured effective quota went up about 3-1/2 percent this year. Because of excess production in 1989, 5 to 10 million pounds of 1989 crop tobacco were sold in 1990. Some growers have tobacco in excess of their penalty free quota (103 percent of the effective quota can be marketed without penalty) this year to carry into the 1991 season.

Under the acreage-poundage program, USDA is required to announce the national marketing quota for the 1991 crop of flue-cured tobacco by December 15, 1990. The 1990 basic quota was 877 million pounds, below prospective use. Supplies have declined each of the last 9 years and represent about 2.4 years use. Because this season's marketings are below 1990's effective quota, the effective quota for 1990 will be higher than the basic quota.

Supplies of burley have declined since 1984, and now represent about 2.35 years use. The 1990/91 supply of burley tobacco is about 2 percent below last season. Carryover stocks on October 1 were 12 percent below a year ago because use exceeded 1989 production. This year's crop increased 22 percent from last year's. Acreage is up 8 percent and yields are up 13 percent.

Last season, disappearance of flue-cured tobacco totaled 954 million pounds, about 8 percent higher than the previous year. Both domestic use and exports rose. The 9-percent increase in domestic disappearance reflects substitution of domestically grown flue-cured for foreign flue-cured and domestic air-cured leaf. Also, relatively stable cigarette output, because of higher exports, aided increased domestic flue-cured use. Domestic disappearance during 1990/91 might remain near 1989/90's higher level because of increased cigarette exports.

Last year's larger crop of relatively good quality together with recent weakening of the dollar should boost U.S. exports. However, U.S. exports continue to be hampered by stagnant or declining cigarette consumption in major importing countries, reduced leaf use per cigarette, quotas and tariffs that discriminate against U.S. tobacco, and sufficient world supplies.

During the year ending September 30, 1990, burley disappearance totaled 615 million pounds, 6 percent above the previous year. Both domestic use and exports were up. Domestic use was up because of stable cigarette production. Exports are up largely because of the good quality 1989 crop.

Total use of burley may about equal last season's level in 1990/91. Domestic use may fall a little and exports rise a little.

For both flue-cured and burley tobacco, legislation requires that the national quota be based on:

- 1) intended purchases by cigarette manufacturers,
- 2) average annual exports for the 3 preceding years, and
- 3) the amount of tobacco needed to attain the specified reserve stock level (15 percent of the basic quota or 50 million pounds of burley or 100 million pounds of flue-cured). USDA's discretion for setting the quota is limited to no more than 103 percent or less than 97 percent of the amount determined by manufacturer's needs and exports, and the reserve stock level. If a quota reduction is required, it is limited to a maximum of a 10 percent reduction.

Both the basic burley and flue-cured quotas may be increased. The effective burley quota will probably increase, but the effective flue-cured quota may decline because of the smaller anticipated increase in the 1991 flue-cured quota and the small amount of unused quota this season.

However, 1991 quota levels depend heavily on purchase intentions of manufacturers. Purchase intentions are the largest item in the formula for setting both flue-cured and burley quotas and they are especially large for burley. Consequently, purchase intentions are extremely important in quota determination and they depend on the industry's assessments of future stock requirements. For flue-cured the export component will be higher but reserve stock levels are a little above minimum requirements.

Among other types of tobacco, supplies of Maryland, fire-cured, dark air-cured, and cigar binder are all down.

Producer referendums will be held in early 1991 to determine if growers of fire-cured (types 21-23) and dark air-cured (types 35-36) desire acreage allotments for their next three crops. Producers of flue-cured, burley, Virginia sun-cured (type 37), Ohio cigar filler (types 42-44), Wisconsin cigar binder (types 54-55) and Puerto Rican cigar filler (type 46) tobacco approved marketing quotas in previous referenda.

#### A Look Ahead

U.S. tobacco production in 1991 may stay near last year's higher level, which was the highest since 1984. Excess supplies have been used up and growing cigarette exports are more than offsetting declining domestic consumption. Also, substitution of domestic tobacco for imports has hiked demand for U.S. grown leaf. However, continuing declines in domestic cigarette consumption will nullify much of the gain in cigarette exports and could well overwhelm the export gains in a few years. Continued large hikes in cigarette wholesale prices, prospects for higher taxes, more and more smoking restrictions, declining social acceptability of tobacco use in the United States, and antismoking activities will almost surely lead to further reductions in domestic cigarette consumption. Cigarette consumption may fall an average of around 3 percent a year over the next several years.



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture

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## TOBACCO COST OF PRODUCTION

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With the passage of the Reconciliation Act of 1985, annual production cost estimates for burley and flue-cured tobacco were required for the price support level formula. Beginning in 1987, the cost of production index (one-third weight) was used along with changes in the 5-year moving average of prices (two-thirds weight) for setting the price support levels for burley and flue-cured tobacco. Even though the Economic Research Service (ERS) had conducted surveys and published cost of production estimates for burley and flue-cured since the early to mid-seventies, these estimates became more significant with the passage of the Act.

Since the mid-1980's the primary source for data used to develop ERS's Cost of Production (COP) budgets for major crop and livestock enterprises has been the Farm Costs and Returns Survey (FCRS). Although this survey is conducted annually, individual crop and livestock operations are rotated and surveyed about every 4 years. Flue-cured tobacco producers were surveyed in 5 States (Florida, Georgia, North Carolina, South Carolina, and Virginia) in 1988 for the 1987 crop year. Burley tobacco producers were surveyed in Kentucky and Tennessee in 1990 for the 1989 crop year. FCRS data obtained from 249 flue-cured producers and 365 burley producers, along with data from National Agricultural Statistics Service (NASS) reports such as Agricultural Prices, Crop Production, and Farm Labor were used to calculate and update the tobacco cost of production budgets.

Flue-cured cost of production estimates are published in the September issue of the Tobacco Situation and Outlook Report and burley estimates are included in the December issue of the Tobacco Situation and Outlook Report. Although each of the cost items is defined in this text, I'm going to summarize and highlight some of the production expenses for 1990.

## Cost of Production Overview

(Figure 1) Burley tobacco total production costs (excluding land and quota) are expected to average \$2,910 per acre in 1990, about a 6 percent increase over 1989 costs. These estimates are based on the new survey data collected this past spring. They will be revised further before being published in the December report. Flue-cured tobacco total production costs are expected to average \$2,423 per acre in 1990, about a 4 percent increase over 1989 costs. The figure shows burley and flue-cured production costs broken down by 4 categories: labor, other variable costs, machinery and barn costs, and general farm overhead.

The major variable cost item for burley tobacco is labor (Figure 2). Labor (both paid and unpaid) is expected to average almost \$1,200 per acre in 1990. A decline in traditional sources of labor, farm consolidation, quota increases since 1987, and higher wages paid in the nonfarm sector have caused changes in labor availability and use on burley tobacco farms. Other major variable cost items for burley include fertilizer, \$243, fuels, \$98, and repairs, \$90 per acre.

The major variable cost item for flue-cured tobacco is also labor (Figure 3). Because flue-cured tobacco harvesting is more mechanized, labor costs are less than for burley on a per-acre basis, estimated to average \$677 per acre in 1990. Flue-cured tobacco growers have also been experiencing shortages of seasonal labor at peak times because of quota increases since 1987 along with larger quotas being grown per farm. Other major variable cost items for flue-cured include curing fuel and electricity, \$394, fertilizer, \$215, and chemicals, \$181 per acre.

Yields and prices received for both burley and flue-cured tobacco are higher in 1990. (Figure 4) After several low yielding years, burley tobacco yields are estimated to average 2,229 pounds per acre in 1990 with growers currently receiving an average price of \$1.70 per pound (Figure 5).

(Figure 6) Flue-cured tobacco yields are estimated at 2,214 pounds in 1990 with growers currently receiving an average price of \$1.65 per pound (Figure 7).

Because tobacco yields tend to fluctuate, ASCS uses a 10-year average trend yield when calculating the production-cost component of the burley and flue-cured price support levels. The cost of production index includes general variable costs plus machinery and barn ownership costs, but excludes three items: the no-net-cost assessment, general farm overhead, and land and quota costs.

Labor costs, which generally increase 4 to 5 percent every year and fuel costs, which might increase 10 to 15 percent this year, are also affected by increased yields and contribute significantly to cost increases.

(Figure 8) Burley tobacco total production costs (excluding land and quota) are expected to average \$130.50 per 100 pounds in 1990, about a 6 percent decrease from 1989 costs because of considerably higher yields in 1990. In spite of cost increases for most production items, higher yields have reduced the cost per pound. Flue-cured tobacco total production costs are expected to average \$113.60 per 100 pounds in 1990, only about a 1 percent decrease from 1989 costs.

#### Definitions and Terms

**Variable costs** are cash expenses (except for opportunity costs for unpaid labor) incurred in the production process. Most variable costs are cash out-of-pocket expenses for specific production expense items.

- o **Labor** is the largest variable cost item for flue-cured and burley tobacco production. The quantity of labor--hired, operator, and family, or the cost of labor for specific job tasks were used to determine the weighted average labor cost. All job tasks, from plant bed and field preparation and care through preparing and hauling the tobacco to market are included.
- o **Fertilizer and Lime** costs for plant beds and fields include liquid, dry, and gas fertilizers, lime, soil conditioners, micronutrients, and secondary nutrients. In some cases, custom application costs could not be separated from the fertilizer cost, and may have been included.
- o **Plant Bed Materials** include seed, fertilizer, fumigants, plastic covers and canvas, pesticides, fungicides, and purchased plant costs.
- o **Chemicals** include insecticides, herbicides, fungicides, sucker control agents, surfactants, wetting agents, and ripeners. In some cases, custom application costs could not be separated from the fertilizer costs, and may have been included.
- o **Custom Operations** include custom or technical service work which includes hiring both machinery and labor together to perform an operation. For tobacco, operations from land preparation through hauling tobacco to market are included.
- o **Noncash Benefits** are items provided to workers including housing, food, washing facilities, fuel, water coolers, portable toilets, vehicles for personal use, utilities, and pasture or feed for worker's animals. An estimated average cash value for those items provided to workers is included.
- o **Fuel and Lubricants** includes expenses for fuels and motor oils needed to operate the machinery and irrigation equipment used to produce the tobacco crop.



- **Curing Fuel, Heating Fuel, and Electricity** includes the total quantity or cost of fuel oil, LP gas, diesel, other fuels, and electricity used for curing flue-cured tobacco. All quantities were converted to a total cost using NASS estimates of regional prices for fuels. For burley tobacco, it includes the total cost of LP gas, coal, and other fuels used for drying the tobacco (if needed) and heating the stripping room.
- **Repairs** include annual repairs and parts for motor vehicles, machinery, barns, and irrigation equipments used for the tobacco crop.
- **Marketing Fee** is the rate established by warehouse operators (but cannot exceed State-regulated maximum levels) multiplied by the gross average cash receipt (yield times price per pound) of the crop. The fee covers warehouse services and facilities where tobacco is marketed. The average marketing fee rate used in 1989 and 1990 was 5.25 cents per dollar of receipts.
- **No-Net-Cost Assessment** level is established by ASCS after consultation with grower loan cooperatives. Factors affecting the rate include quantities of tobacco under loan, expected loan takings, interest rates, current demand and other factors affecting loan stocks, and length of time the stocks remain under loan. The fee covers potential losses, assuring that the loan program operates at no net cost to the Government, except for administrative expenses. The 1989 and 1990 rates were 1 cent per pound.
- **Inspection and Grading Fee** covers the cost of grading and inspecting tobacco on the warehouse floor. This rate is established by the Agricultural Marketing Service and the cost per acre is based on production. The 1989 and 1990 rate was 67 cents per 100 pounds.
- **Interest** for variable operating expenses is charged at the prevailing 6-month Treasury bill rate. The money to pay hired labor was assumed to be borrowed for 3 months, all other variable costs except the marketing fee and the inspection and grading fee were charged interest for 6 months.
- **Other costs** include sheets, sticks, twine, cover crop seed, and baling supplies.

**Machinery and barn ownership costs** include expenses associated with owning, using, and replacing machinery, equipment, and barns used in tobacco production.

- **Capital Replacement** is the annual amount needed in reserve to replace the machinery, equipment, and barns when they wear out. An average charge for the replacement of capital



is based on the current asset price, hours used, and estimated years of life.

- o **Return to Other Nonland Capital** is the rate of return expected on capital invested in machinery, equipment, and barns for a given year. An operator should expect the capital invested in these inputs to receive an annual return equal to their opportunity costs. It is calculated by taking the total value of machinery, equipment, and barns used for tobacco operations and multiplying by a longrun real rate of return to production assets in the farm sector.
- o **Taxes and Insurance** costs are based on the purchase prices and salvage values of machinery, equipment, and barns used.

**Other costs** include general farm overhead and land and quota charges.

- o **General Farm Overhead** includes items required for general business operations including: farm shop equipment; water, telephone, and electricity; general business expenses; registration and license fees; association and professional dues; blanket insurance and any damages paid, fencing maintenance and repairs; and pesticides for maintaining roadways and ditches. Because these costs are paid for general farm maintenance they are allocated to tobacco based on the total farm expense for these items multiplied by the ratio of tobacco receipts to total farm receipts.
- o **Land and Quota Charge** can be a difficult item to estimate for tobacco because quota production rights combined with support prices are capitalized into land prices. This item is based on a composite cash/share rental value that includes (1) the payment per pound for cash rented quotas multiplied by the average yield per acre, and (2) the rental rate per pound for share rented quotas multiplied by the average per-acre cash receipts. This opportunity cost is then calculated by taking the cash rental value and share rental value and weighting each by its respective share of total acreage rented.

## Tobacco Production Costs

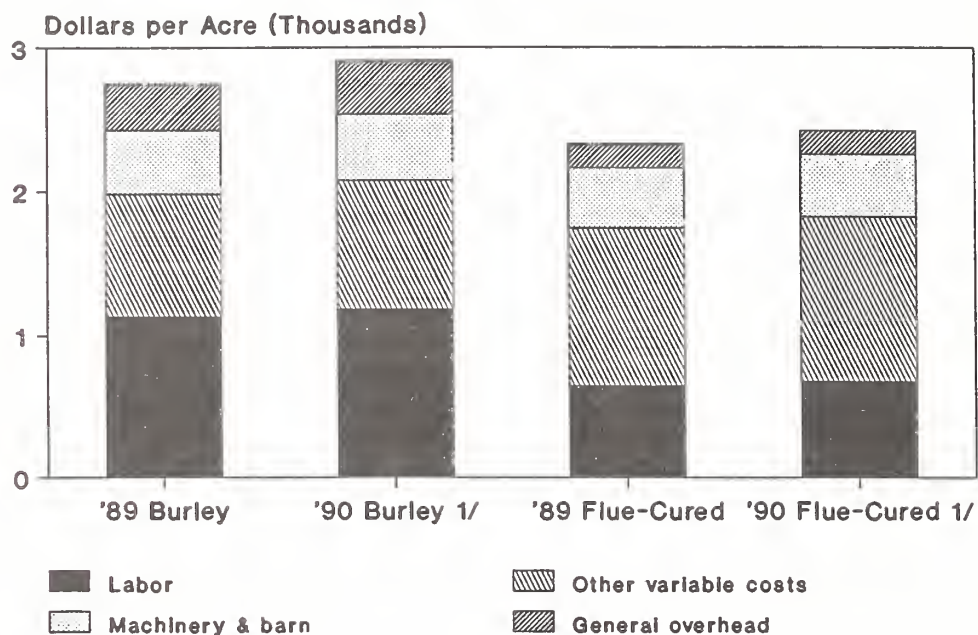


Figure 1

## Burley Tobacco Major Variable Cost Items, 1990 1/

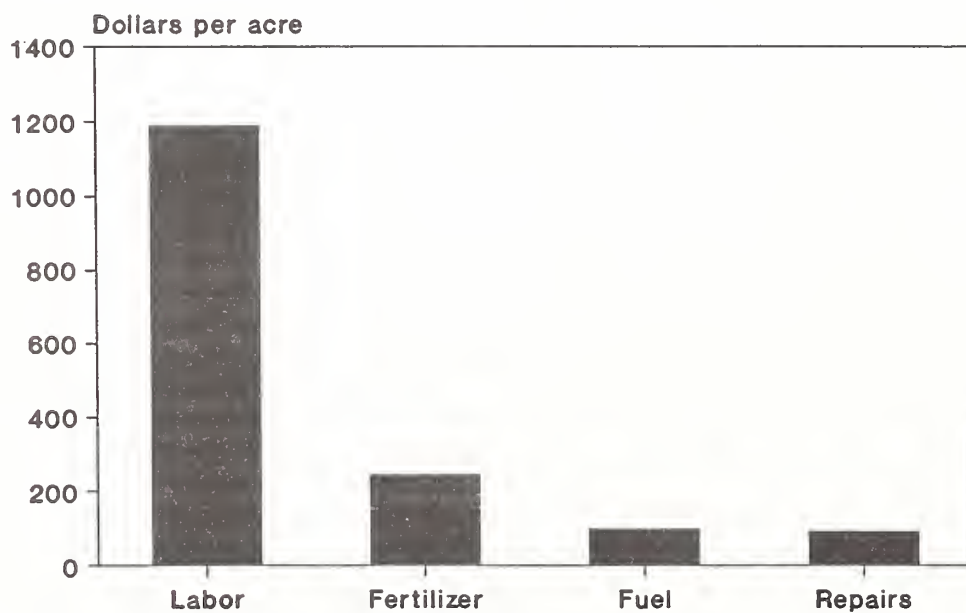
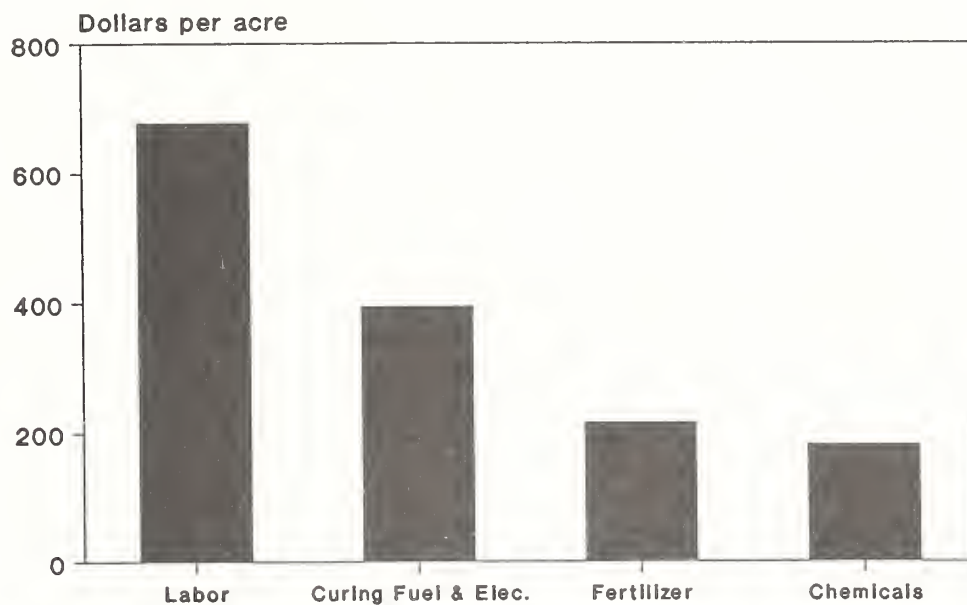


Figure 2

## Flue-Cured Tobacco Major Variable Cost Items, 1990 1/



1/ Preliminary.

Figure 3

## Burley Tobacco Yields

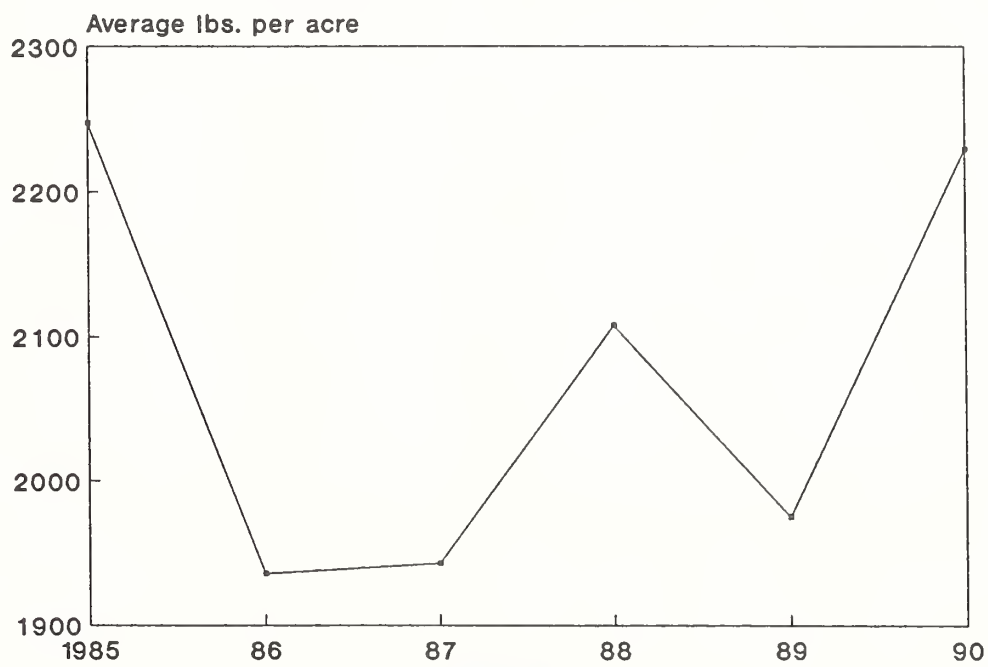


Figure 4

## Burley Tobacco: Average Price Received

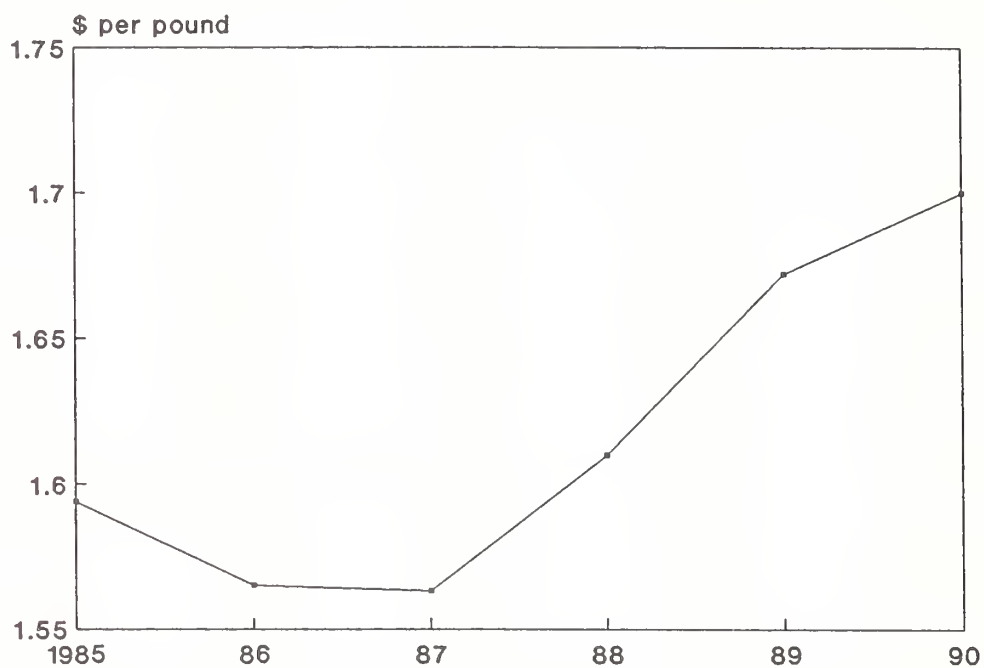


Figure 5

## Flue-Cured Tobacco Yields

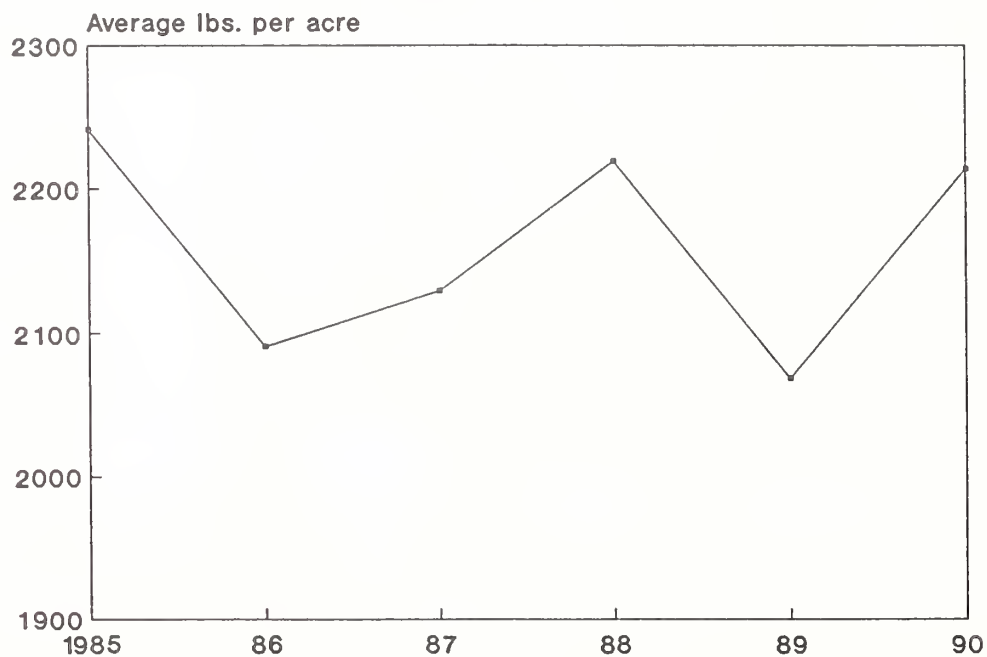


Figure 6



## Flue-Cured Tobacco: Average Price Received

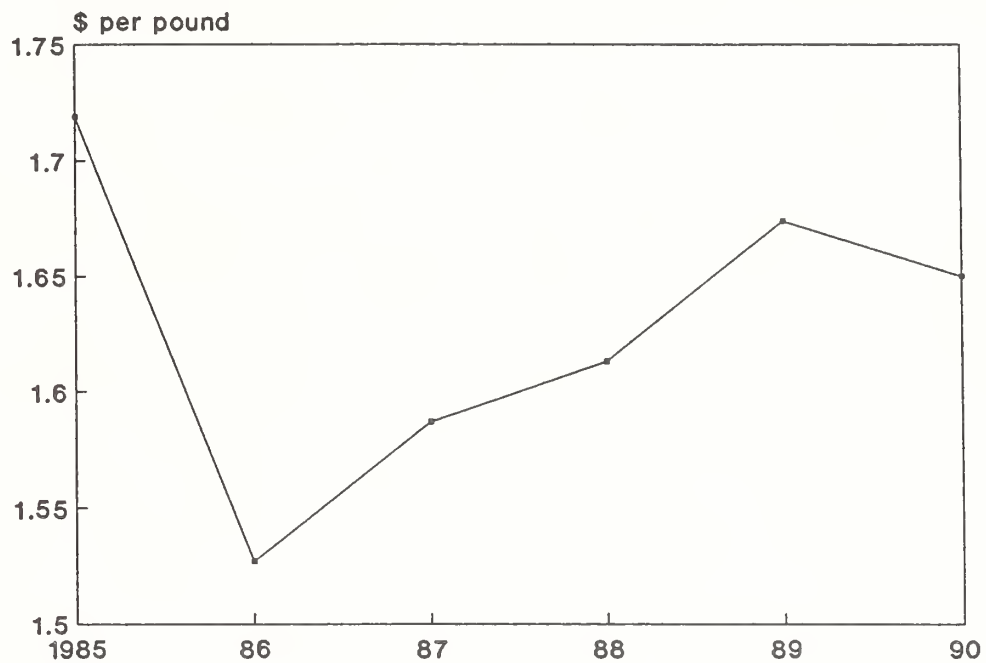
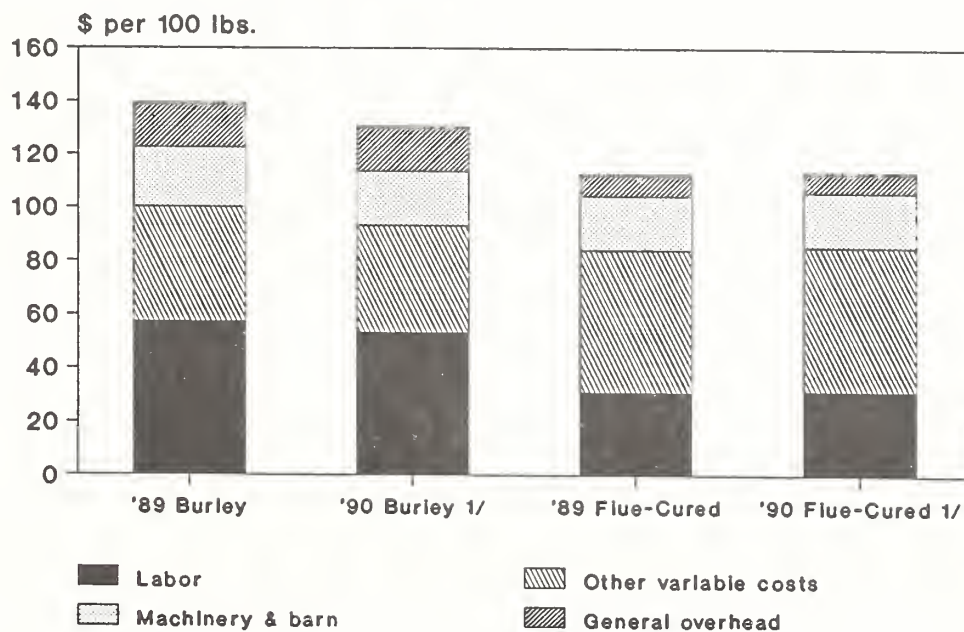


Figure 7

## Tobacco Production Costs



1/ Preliminary.

Figure 8

# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

United States Department of Agriculture  
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## **BURLEY QUOTA UNDERUTILIZATION**

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One of the major goals of the 1985 Tobacco Improvement Act (TIA) was to design a tobacco program that would improve the market share of U.S. tobaccos in both foreign and domestic markets. The lower market prices brought about by the 1985 TIA, the decline in the value of the U.S. dollar relative to foreign currencies and the increasing demand for American-blended cigarettes have increased demand for U.S. tobaccos in international markets in recent years. However, further expansion of U.S. burley tobacco has been constrained considerably by the underproduction of U.S. burley quota since 1985. The new "market oriented" quota formula under the TIA was designed to generate a supply level closely corresponding to manufacturers' and dealers' needs. Therefore, when domestic burley producers do not market their allotted quota, supplies for burley leaf export markets and domestically-produced cigarettes are limited. This situation forces both domestic and foreign cigarette manufacturers to find alternative burley supplies.

In discussing the underutilization of burley tobacco quota, I will concentrate on three specific areas. First, I will review historical trends in the production of U.S. burley quota on a national, state, and regional basis. Next, I will identify factors that affect the utilization of U.S. burley quota. Finally, I will discuss expected future trends in U.S. burley production under the revised burley tobacco program.<sup>1</sup>

### **National, State, and Regional Underproduction Patterns**

#### National Burley Production Patterns

Nationally, underproduction of burley effective quota has occurred in 17 out of 20 years of the poundage program, and has often accounted for a large part of U.S. burley quota. Underproduction of U.S. burley effective quota during 1971-1981 averaged 100 million pounds annually (or 15% of the effective quota) (Table 1). The 1982-1985 period was a mirror image of 1971-1981, characterized by a significant increase in the utilization of U.S. burley effective quota. Omitting the drought-stricken 1983 crop, U.S. burley farmers produced 104% of the effective quota during the 1982-1985 period. This trend was reversed during the 1986-1990 period. Underproduction has once again become a serious problem with 20% of the U.S. burley effective quota not being utilized during the past five years (Figures 1-2).

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<sup>1</sup> This paper updates a previous extension report entitled *Analyzing the Underproduction of Burley Tobacco Quota* (1989) and is partially based on a working draft entitled *Current and Future Status of U.S. Burley Production* (1990). Both of these reports are available from the author.

Table 1: Utilization of U.S. Burley Effective Quota

Year	Effective Quota	Production	Over/(Under) Production	Percent of Utilization
-----millions of pounds-----				
1971	553	473	(80)	86%
1972	612	601	(11)	98%
1973	574	450	(124)	78%
1974	707	613	(94)	87%
1975	750	639	(111)	85%
1976	726	679	(47)	94%
1977	683	617	(66)	90%
1978	668	626	(42)	94%
1979	648	446	(202)	69%
1980	769	561	(208)	73%
1981	842	730	(212)	87%
Ave. 71-81	685	585	(100)	85%
1982	778	822	44	106%
1983	641	481	(160)	75%
1984	697	712	15	102%
1985	542	573	31	106%
Ave. 82-85	664	647	(17)	97%
1986	488	408	(80)	84%
1987	525	419	(106)	80%
1988	559	477	(82)	85%
1989	661	483	(178)	73%
1990*	742	587	(155)	79%
Ave. 86-90	595	475	(120)	80%

\* Based on November 1990 crop report

SOURCE: TOBACCO OUTLOOK AND SITUATION REPORT, USDA

## State Burley Production Patterns

Kentucky, the nation's largest burley producing state, has been the most efficient state in utilizing its quota--producing 91% of its allotted effective quota since 1986 (Figure 3). The second largest quota holding state, Tennessee, has utilized only 56% of its effective quota and only 76% of its basic quota since 1986. Tennessee growers accounted for 47% of the national underproduction of quota, despite only possessing 22% of the effective quota during the 1986-90 period (Figure 4). Other states with small aggregate quotas in the burley belt include North Carolina, which has produced 58% of its allotted quota since 1986, Virginia, 67%, Ohio, 77%, Indiana 76%, Missouri, 82%, and West Virginia, 47%. Therefore, underproduction of quota is prevalent throughout the entire eight state burley belt.

## Regional Burley Quota Utilization

Figure 5 illustrates the percentage of burley quota produced in the counties of the four largest burley producing states, Kentucky, Tennessee, Virginia, and North Carolina during the 1986-89 period. Over this time span, 48 of the 119 burley producing counties in Kentucky produced over 90% of their effective quotas, with most of the remaining counties producing over 80% of their effective quotas. None of the Tennessee, North Carolina, and Virginia burley producing counties had utilization rates above 90%, with over one half of these counties utilizing less than 50% of their effective quotas since 1986.

Evaluating the volume of underproduction per county instead of the percentage of quota utilization per county provides a better indication of the source of burley underproduction. Many people claim that since many of these Tennessee, North Carolina, and Virginia counties have such low percentages of the burley quota, one should not worry about them in terms of volume of underproduction. However, a large volume of underproduction has occurred in central and eastern Tennessee, western North Carolina, and the Virginia panhandle since 1986 (Figure 6). From 1986-89 only one Kentucky county (Fayette) averaged over a million pounds of underproduction compared to 17 Tennessee counties, 4 North Carolina counties and 3 Virginia counties. Three Tennessee counties averaged over 2 million pounds of underproduction during this period. Therefore, while Kentucky certainly does have an underproduction problem in some areas, the majority of the underproduction problem within the burley belt lies in Tennessee, Virginia and North Carolina.

## **Factors Affecting the Utilization of Burley Effective Quota**

Underproduction of burley quota can be broken down into underproduction due to reduced yields and underproduction due to underplantings (i.e., not planting enough acreage to produce the quota given "normal" yields).

### **Yields**

Burley tobacco yields have, in general, declined since the burley poundage program was adopted in 1971 (Figure 7). The average burley yield per acre since 1971 has been 2165 pounds, compared to an average of 2432 pounds per acre over the last five years of the acreage allotment program (1966-1970). This general decline in yields can be partially explained by the change in optimal yield levels under different



tobacco programs.<sup>2</sup> However, after a few years of adjustment by growers in discovering the "optimal" yield under a poundage program, one would expect burley yields to stabilize assuming steady input prices. A portion of the decline in yields in recent years has been due to very poor growing and curing conditions experienced throughout most of the burley belt. Thus, many observers are quick to identify these unfavorable agronomic conditions as the major reason for underproduction in recent years. However, even if the industry would have achieved "normal" yields during 1986-89, underproduction of burley would still have amounted to 15% of the effective quota compared to 20% given actual yields.<sup>3</sup>

While not all areas of the burley belt have enjoyed "ideal" growing/curing conditions, agronomic conditions for 1990 have certainly been much improved relative to previous years. The average burley yield projected for 1990 is 2229 lbs/acre, the highest average yield since 1985. Tennessee, expected to produce only 51% of its quota in 1990, is forecast to have a 2200 lb/acre yield -- its highest yield since 1978. Despite improved yields, the industry is still some 70,000 acres below what would be necessary to produce the quota (Figure 8). The above discussion, thus, provides sufficient evidence to show that the underproduction problem since 1986 has mainly been an acreage problem.

### **Acreage**

U.S. burley acreage has increased from 210,700 acres in 1986 to an estimated 263,300 acres in 1990. However, the trend of decreased acreage planted per pound of effective quota continued in 1990 with only 3.54 acres of burley planted per 10,000 pounds of effective quota (Figure 9). This compares to 4.7 acres per 10,000 pounds of effective quota being planted in 1985. Figure 10 examines underplantings of burley acreage in Kentucky, Tennessee, North Carolina and Virginia counties during 1986-89. Of the counties included in Figure 10 only 7 (all of which were in Kentucky) planted enough acres to produce their allotted quotas from 1986-1989 (based on "normal" county yields). Twenty counties (all located in Tennessee, North Carolina and Virginia) averaged underplantings in excess of 500 acres annually. Obviously, with so much underplanting, many counties could not come close to producing their effective quota in recent years even with substantially above average yields. Given that the underproduction problem has basically been due to underplantings, the question becomes what factors are preventing the burley quota from being planted. A survey of Kentucky county agricultural agents in 1989 cited 6 main reasons for underproduction occurring in their counties (Figure 11). The following sections discuss each of these major factors constraining burley acreage.

### **Labor Constraints**

Tobacco farmers claim that the labor situation in the burley belt has escalated to critical levels as

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<sup>2</sup> Prior to 1971, burley acreage controls provided economic incentives for producers to increase yields since there were no constraints on the number of pounds each producer could market from his/her allotted acreage. However, with a fixed number of pounds which an allotment holder can market under the current program, growers no longer attempt to obtain such high yields. The high cost of productive inputs (i.e., fertilizers and chemicals) has encouraged individual producers to trade off increased acreage for lower yields in an attempt to produce the allotted quota.

<sup>3</sup> A "normal" belt-wide yield is assumed to be 2100 lbs/acre. This number was selected based on evaluating the average yield during 1980-1990, excluding the high and low yields (i.e., 2103 lbs/acre) and the median yield during 1980-1990 (i.e., 2108 lbs/acre). Even if one optimistically selects a "normal" belt wide yield of 2200 lbs/acre, over 11% of burley effective quota would still have not been produced during the 1986-1989 period.

both the quantity and quality of labor has diminished significantly in recent years. Off-farm labor opportunities have surfaced in many areas of the burley belt offering higher wages, benefits, full-time employment, and a better working environment than burley growers can offer. According to the Kentucky county agricultural agents survey, labor is the number one problem causing underproduction of burley quota in Kentucky. As a result of this situation, several farmers have turned to migrant laborers to harvest and strip their crop during the past two years. While several problems have been cited, most growers have been fairly satisfied with the performance of migrant laborers. A diminishing labor supply has also renewed interest in adopting various forms of labor saving innovations (e.g., automated harvesters, alternative barn designs, field curing, cable hoist housing, stripping machines). Large investment costs and uncertainty of the tobacco program/industry have prevented a lot of producers from adopting these technologies. However, if the labor supply continues to deteriorate, more producers will likely adopt some of these technologies assuming the burley tobacco outlook continues to improve.

#### Market Prices/Profit Expectations

Previous research has supported the hypothesis that burley farmers are very responsive to price changes. A review of Figures 1-2 reveals that the only extended period when U.S. burley growers came close to fully utilizing the quota was during the 1982-1985 period. Although other factors, such as depressed commodity prices for alternative agricultural enterprises, abundant labor availability (due to high unemployment rates), and above average yields (except for 1983) certainly played major roles in explaining the dramatic increase in burley quota utilization, one cannot dismiss the positive effects that record level burley price supports and prices had on utilization during this period. Growers claim that the large price reduction induced by the 1985 TIA and slowly increasing price supports/market prices since 1985 have been major factors provoking underproduction in recent years. While market prices have increased since 1985, farmers claim that production expenses (e.g., labor, fertilizer, chemicals) have increased at greater rates. This has decreased profit expectations and forced some burley producers to look for off farm employment, while preventing other farmers from expanding burley production.

#### Alternative Employment Opportunities

A large percentage of the quota holders are part-time farmers, retired farmers or absentee landowners who must rely on cash leasing or various rental agreements among tenants to get their quota produced. Preliminary survey results reveal that 27% of Kentucky quota holders do not live on the farm where tobacco quota is held, 56% of burley quotas are produced by tenants and 36% of the surveyed quota holders indicated being retired. According to the 1987 Census of Agriculture, over 60% of Kentucky and Tennessee tobacco farm operators worked off the farm. This trend of increased dependence on off-farm income is likely to continue, given the stability and size of returns, better working conditions and benefits associated with off-farm employment. Thus, it is unlikely that many farmers who are currently working off the farm will expand their production base in the future. In addition, more quota holders that are currently producing tobacco may eventually opt for an off-farm job. This will put increasing pressure on a limited and diminishing number of full-time tenants to grow a larger portion of the crop.

#### Small Quotas

Most burley tobacco quotas are very small. In 1989, 61% of U.S. burley farms had quotas less than 1300 pounds, with 46% less than 1000 pounds. Many of these quota owners do not have much if any economic incentive to devote resources to producing such small quotas. Furthermore, it is often very difficult for many of these small quota holders to find someone willing to lease-in such small quotas in many areas of the burley belt where lease prices are approaching zero. On the surface, it appears that not producing these very small bases would not add much to the underproduction problem. However, when



one multiplies these small quotas by the thousands and thousands of allotment holders who elect not (or cannot find someone) to produce their quota, a large amount of underproduction evolves.

#### Limited Barn Space

During the past couple of years, a few burley tobacco producers have built new curing barns. However, the curing barns for many burley tobacco producers depreciated many years ago. While improvements have been made to some of these structures over time, many of these barns are in very poor condition. Given the uncertainty of the tobacco industry, many producers are reluctant to make major capital investments in repairing or replacing these barns. As a result of deteriorating barn conditions and increasing quotas in recent years, barn space is becoming limited in many areas of the burley belt. Curing barns that are not being used are primarily on farms where quota has been leased out. Often times these empty barns are too far away from producers needing additional barn space. Therefore, barn space has certainly prevented a lot of producers from expanding their production base. A few farmers have moved to double barning their tobacco (i.e., curing two crops/season in one barn) in order to have enough space for curing their tobacco. Others are planning to construct covered wooden field curing structures to house their tobacco. However, these represent only a few growers. Unless major cuts in the quota are observed during the 1990s, many burley farmers will be forced to build new barns/curing facilities or make significant improvements in existing housing structures in the near future.

#### Other Constraining Factors

Several other factors have also been identified by farmers limiting burley production. Although lease prices have declined considerably in recent years, many counties (some with a significant volume of underproduction) are still experiencing relatively high lease prices (25-40 cents/lb). Various surveys indicate that the age of tobacco farmers becomes a major concern in evaluating the future of burley production. Young farmers may be more likely to expand production and make long-term capital investments (e.g., barn/equipment purchases, technology adoption, quota purchases) than older farmers. Although many burley tobacco farmers appear to have the credit capacity needed to make large/long term capital investments in their tobacco enterprise, many are reluctant to do so given a continued fear of tobacco program elimination. The 103% maximum allowable marketing provision implemented by the 1985 TIA is also believed to have affected quota utilization adversely by reducing the acreage farmers plant to hedge against yield variability.

### **Future Production Trends Under Revised Burley Tobacco Program**

The above discussion has focussed primarily on the ability of the U.S. burley tobacco industry to produce the effective quota. In reality, the effective quota has "snowballed" in recent years. Just 5 years ago, the national effective quota was 488 million pounds. Given an expected increase in the 1991 burley quota, the U.S. burley effective quota for the upcoming year may approach 800 million pounds. A large amount of this effective quota (and effective quotas in previous years) will be (was) due to undermarketings. Instead of waiting for additional U.S. burley marketings the following year to replenish declining inventories, U.S. tobacco companies have continued to rely heavily on imported burley to make up for U.S. burley production shortfalls. Therefore, one may argue that the industry really does not need to produce 100% of this inflating effective quota. With U.S. burley disappearance expected to stabilize around 600-625 million pounds during the early 1990s, a few years of production in the 650-700 million pound range would provide enough burley supplies to meet expected current demand, plus allow the industry to replenish critically low loan and manufacturers' stocks. Thus, the critical research question may be does the industry have the ability to produce a 650-700 million pound crop during the next few years, instead of asking whether the

industry will produce the escalating effective quota. If U.S. burley prices continue to increase slowly relative to production costs, the above examination of the structural constraints confronting the U.S. burley tobacco industry (e.g., labor supplies, barn space, off-farm employment opportunities, declining number of tobacco growers) causes one to be skeptical of whether the U.S. burley industry will be able to meet the increasing worldwide demand for U.S. burley tobacco during the early 1990s. However, recent changes in the U.S. burley tobacco program will likely improve U.S. burley production relative to the quota.

According to the Farm Poundage Quota Revisions Act of 1990, the following provisions will be in place for the 1991 and subsequent crop years.

- 1) The sale of burley quota will be permitted from one farm to another farm within the same county. The sale of quota would be limited to 30% of the buyer's existing quota or 20,000 pounds, whichever is greater. Purchasers of quota will be prohibited from selling that quota for three years to prevent speculative buying.
- 2) The leasing limitation will be increased from its current maximum of 15,000 pounds to 30,000 pounds.
- 3) Quota holders will be required to lease or attempt to grow their allotment two out of three years or forfeit allotment beginning with the 1994 crop year. This replaces the current one out of five year plan.
- 4) The division of farm quota (unless division is among family members) resulting in quotas less than 1000 pounds will be prohibited.
- 5) A referendum for cross county leasing of quota will be held in Tennessee.

Collectively, these program changes will likely result in an improvement in burley quota utilization. However, many of the structural constraints cited above will tend to limit their effectiveness. The three provisions that will likely have the largest impact on the production of burley quota are the sale of quota (#1), the two out of three year provision (#3) and the cross county leasing referendum (#5) if passed. Increasing the leasing limit (#2) will primarily affect only a few growers in central Kentucky, while prohibiting the division of quota into less than 1000 pounds (#4) will affect an insignificant amount of burley quota. Therefore, policy changes (#2) and (#4) will have a very minimal effect on burley production. Thus, the following discussion focuses on policy changes (#1), (#3), and (#5).<sup>4</sup>

Since within county sale of quota was instated in the flue-cured belt in 1982, over 60% of flue-cured quotas have been sold. However, it is unlikely that a significant consolidation of burley quotas would occur in the short-run due to 1) limited barn space, 2) tight labor supplies, 3) perceived burley program uncertainty which inhibits capital investment in curing barns, mechanization, etc., 4) low lease prices in some counties and 5) limited per unit cost benefits resulting from increased production base for many producers. Many of these factors are currently present in large underproducing areas of the burley belt. Furthermore, some of the quota that will be sold will simply replace quota that was produced under the lease and transfer program as some quota holders will elect to sell their quota instead of being faced with the annual "burden of finding a grower willing to lease in their allotment at an agreeable price. A large volume of sale transactions will likely be made by small quota holders who work off the farm, absentee landowners and retired quota

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<sup>4</sup> For more details on all these policy changes see Snell, et al. "Policy Alternatives and Consequences Addressing the Underproduction/Undermarketings of Burley Tobacco." Papers on The Marketing of U.S. Produced Tobacco. J. Paxton Marshall, ed., August, 1990, pp. 65-72.



holders. This policy change may encourage some young aggressive farmers to stay in the industry and possibly expand as it increases their flexibility in making long-term investment decisions (e.g., purchasing new machinery or building additional curing barns).

One of the factors that will likely increase the number of quotas being sold (especially if the cross county leasing referendum is not passed in Tennessee) is the provision which requires quota holders to lease or attempt to grow their quota two out of three years to prevent losing their base. However, the two out of three year provision will not become effective until 1994 and will mainly affect small quota holders.

Based upon the above discussion, one may argue that only a small volume of the burley quota will be sold over the next few years. Without a large volume of quota being transferred to "serious" growers, it will be difficult to improve burley quota utilization and production significantly. Two factors that would likely result in a large volume of quota being produced would be cross county/cross state quota sales and/or rapidly increasing market prices -- both of which are very unlikely to occur. Therefore, while burley tobacco production will probably increase relative to the quota, it appears that the U.S. burley industry will continue to experience a large percentage of the quota not being produced in the near future.<sup>5</sup> While these program changes may not lead to the 650-700 million pound burley crops needed to build up stocks during the next couple of years, they may result in burley crops large enough to meet current demand, given favorable growing conditions. Over a longer horizon (e.g., 3-5 years), these provisions will eventually allow the quota to move to efficient growers who will be willing to produce additional quota if market conditions remain favorable.

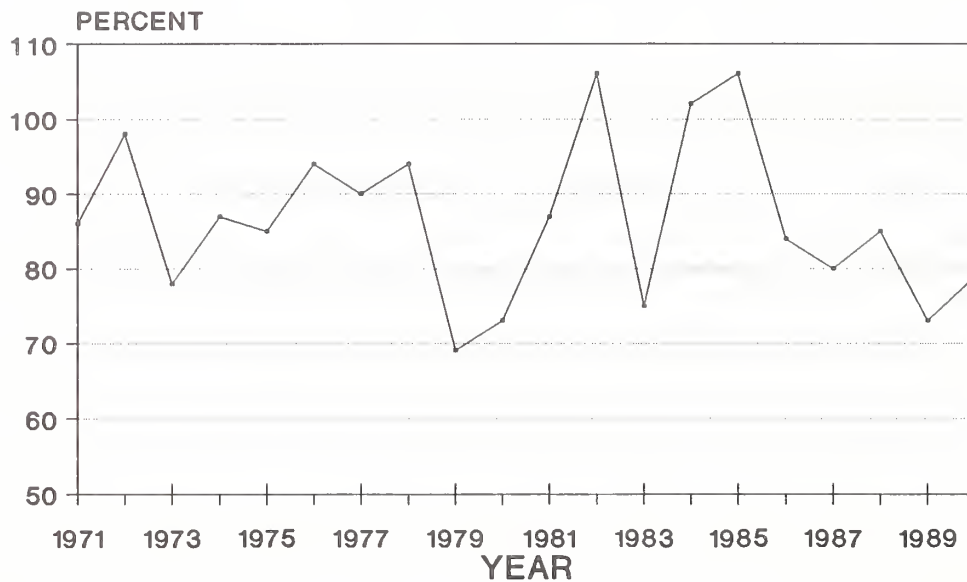
### Summary and Conclusions

Underutilization of U.S. burley quotas during the latter part of the 1980s prevented the U.S. from taking advantage of an increasing worldwide demand for burley tobacco. Some of the underproduction was due to below average yields, but the vast majority of underproduction was due to underplantings. Labor shortages, lower prices/diminished profit perceptions, limited barn space, increasing off-farm employment opportunities, and program uncertainty have limited burley production in recent years. These factors will continue to limit the industry's ability to provide adequate supplies during the early 1990s. The recently enacted burley tobacco program changes will improve burley quota utilization, but the degree and speed of effectiveness of these changes will depend considerably on factors such as future market price increases, labor availability, barn space, quota consolidation and the adoption of mechanization. Given that the outlook for these factors does not appear to be overly positive, the U.S. burley tobacco industry may continue to experience tight supplies in the near future. However, the revised tobacco program will improve production relative to the quota which will enhance the chances of the U.S. burley tobacco industry improving its market share in both foreign and domestic markets during the 1990s.

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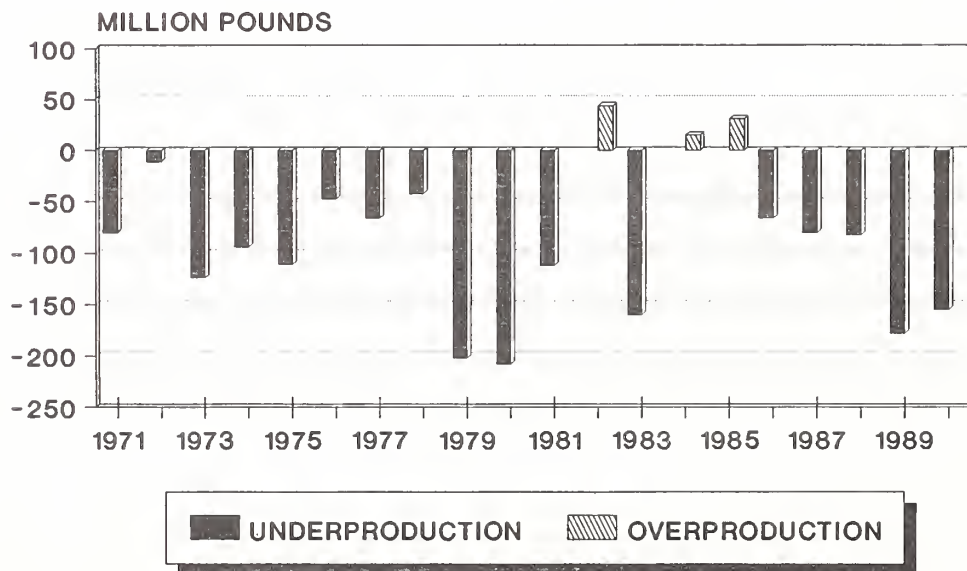
<sup>5</sup> Preliminary results from a leaf tobacco dealer's survey indicate that dealers expect these program changes will, on average, result in about 85% of the effective quota being produced during a normal growing season.

**FIGURE 1**  
**PERCENTAGE OF BURLEY EFFECTIVE**  
**QUOTA PRODUCED**



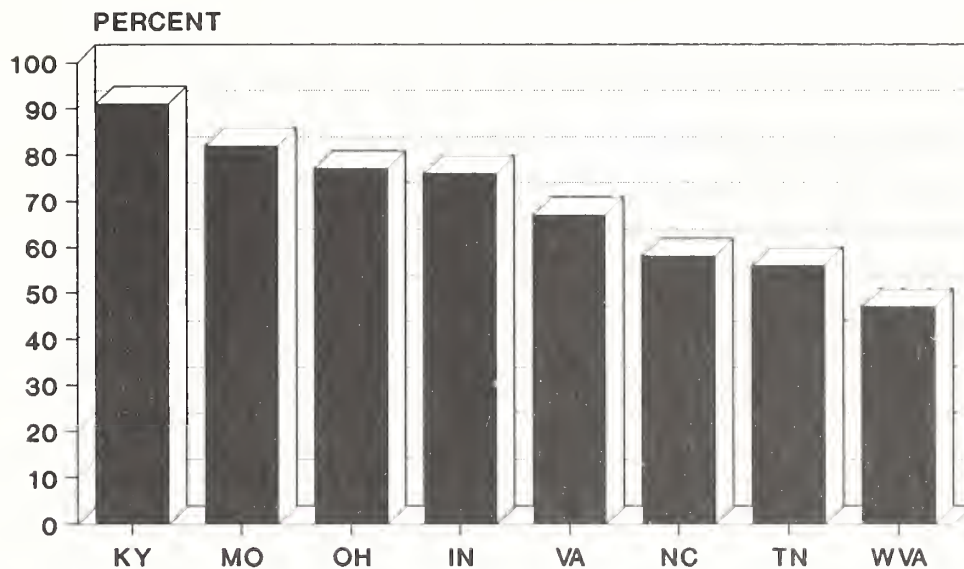
SOURCE: TOBACCO SITUATION AND OUTLOOK

**FIGURE 2**  
**OVER/UNDERPRODUCTION OF**  
**US BURLEY EFFECTIVE QUOTA**



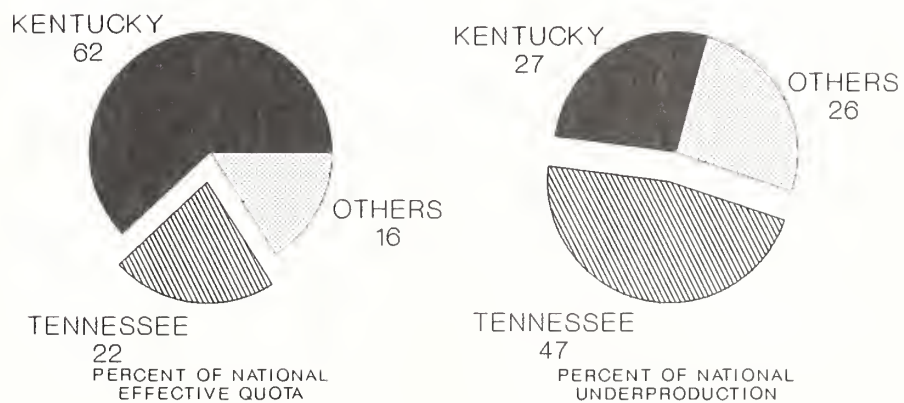
SOURCE: TOBACCO SITUATION AND OUTLOOK

**FIGURE 3**  
**UTILIZATION OF BURLEY EFFECTIVE QUOTA**  
**(1986-90)**



SOURCE: USDA/ASCS

**FIGURE 4**  
**DISTRIBUTION OF QUOTA AND**  
**UNDERPRODUCTION (1986-1990)**



SOURCE: USDA/ASCS

FIGURE 5

REGIONAL UTILIZATION OF BURLEY EFFECTIVE QUOTA

(KY, TN, VA, NC 1986-1989)

PERCENT

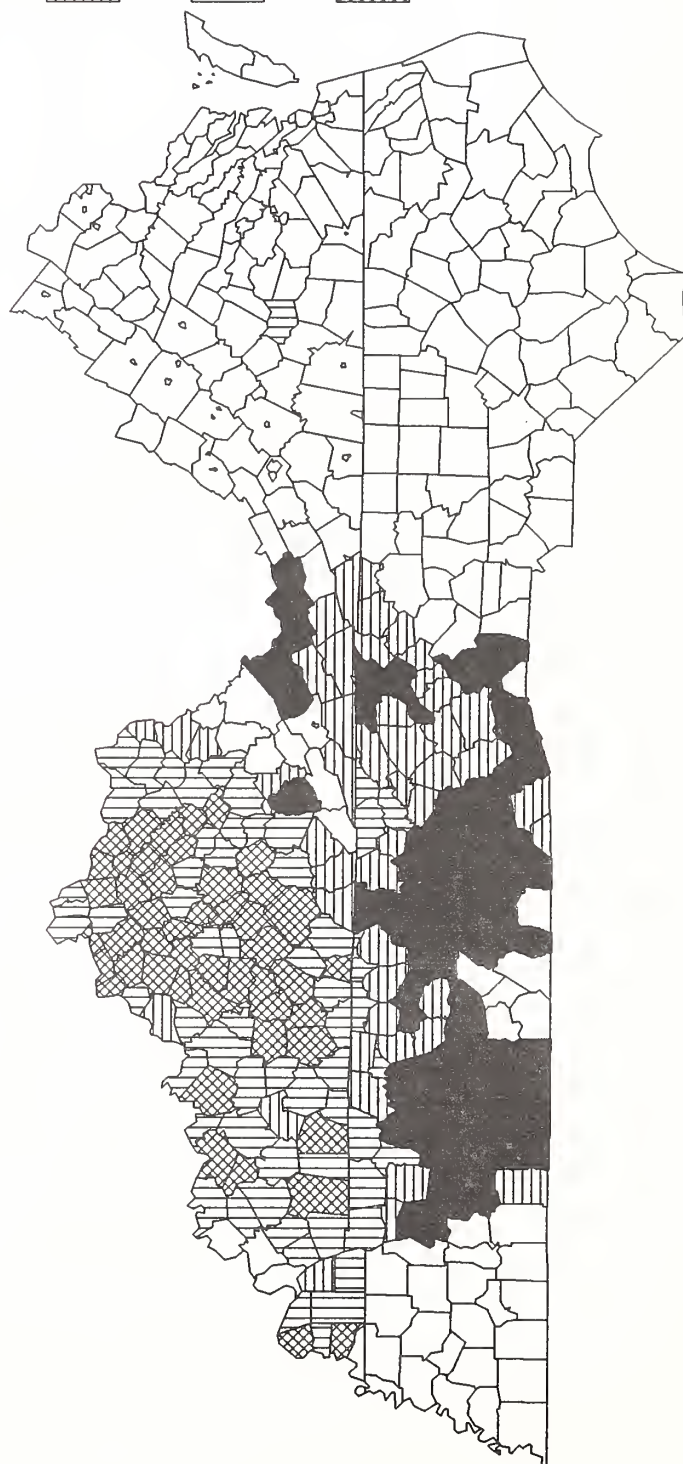
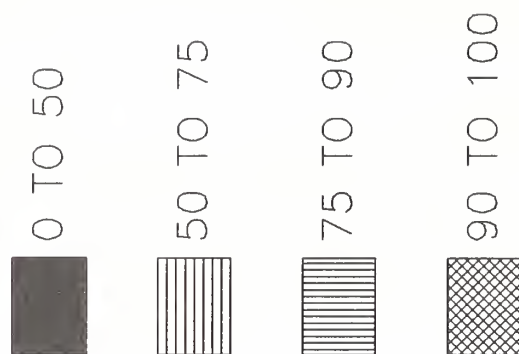
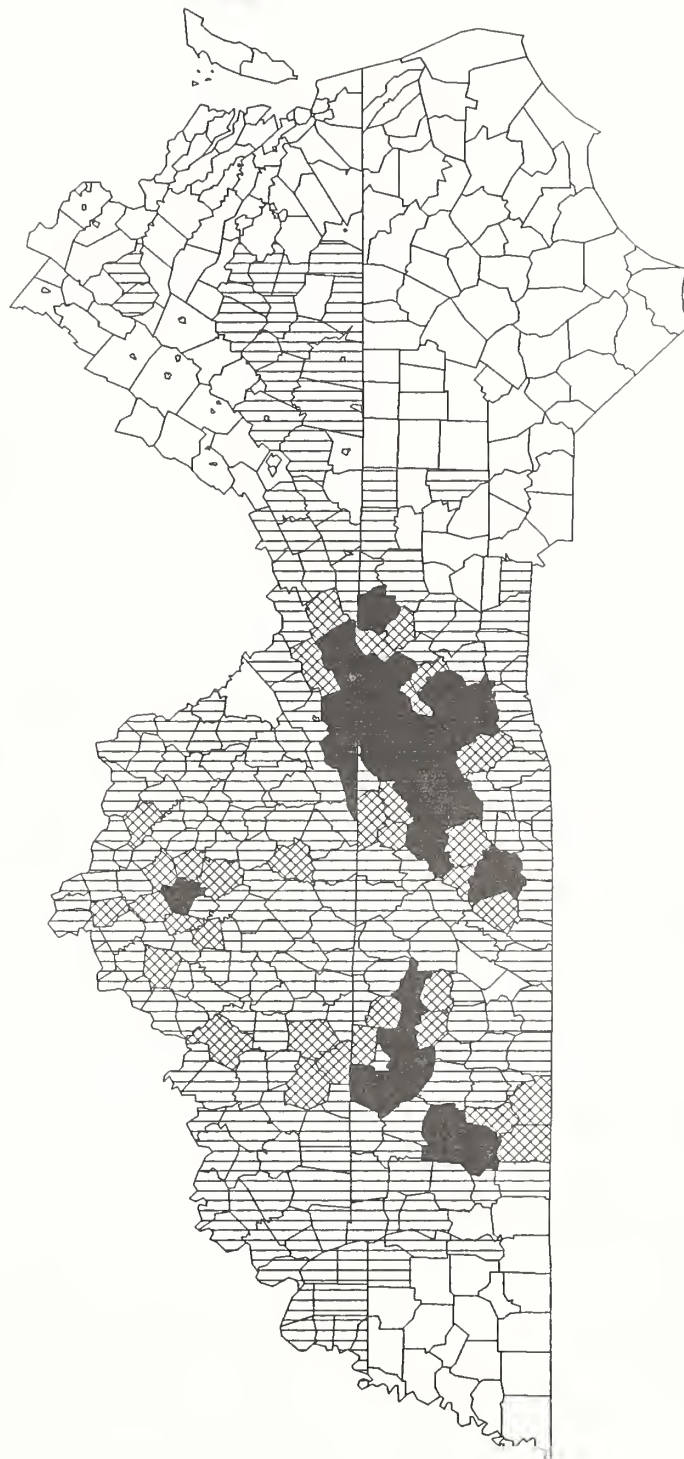


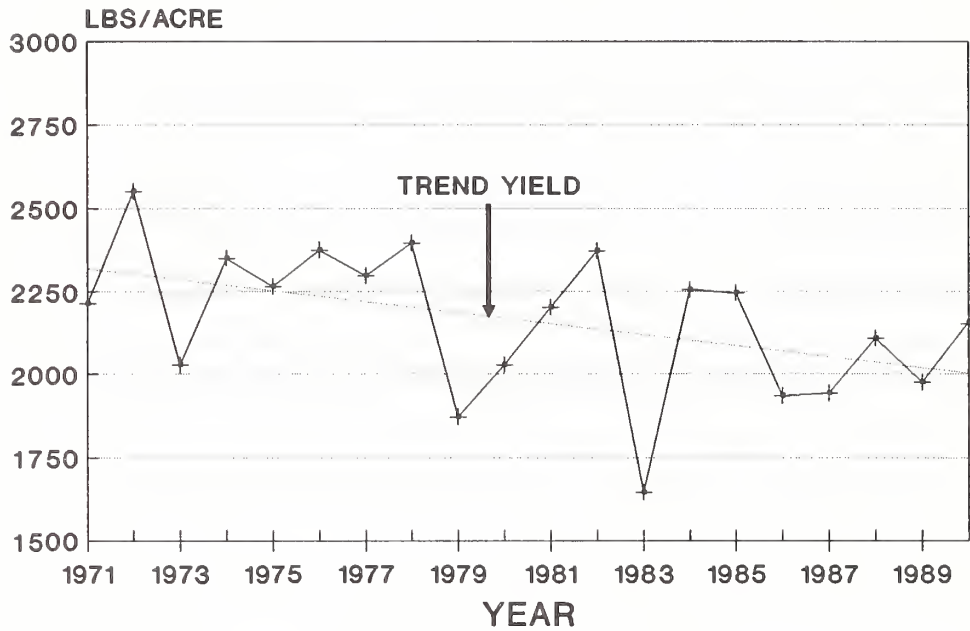


FIGURE 6

REGIONAL UNDERPRODUCTION OF BURLEY EFFECTIVE QUOTA  
(KY, TN, VA, NC 1986-1989 AVERAGE) MILLION POUNDS

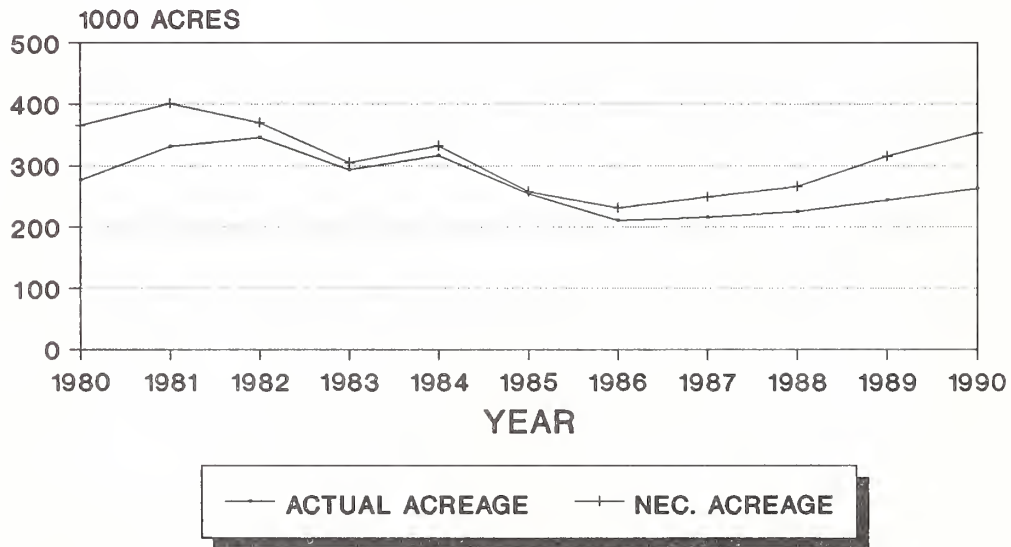


**FIGURE 7  
AVERAGE BURLEY YIELDS**



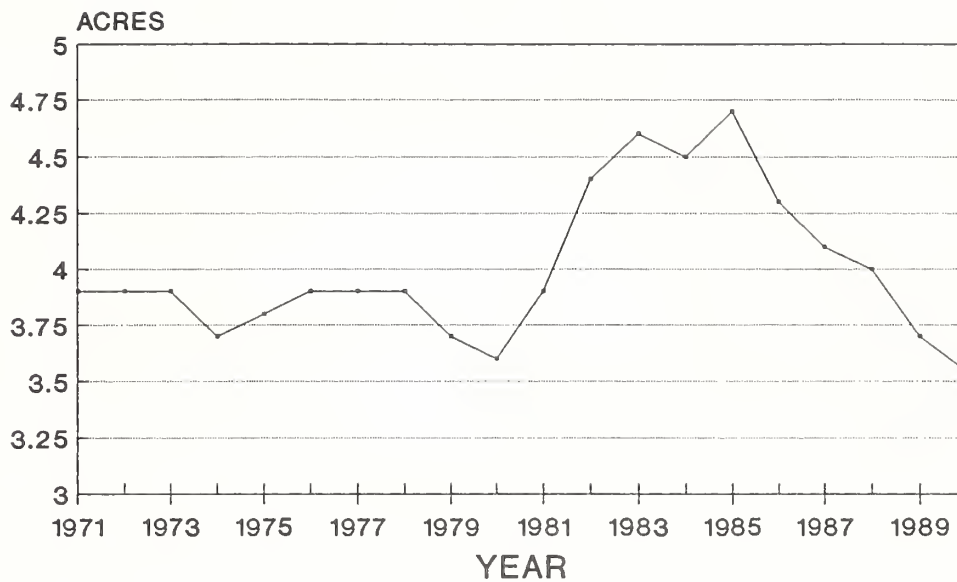
SOURCE: TOBACCO SITUATION AND OUTLOOK

**FIGURE 8  
US BURLEY ACREAGE  
(ACTUAL VS NECESSARY TO PRODUCE QUOTA)**



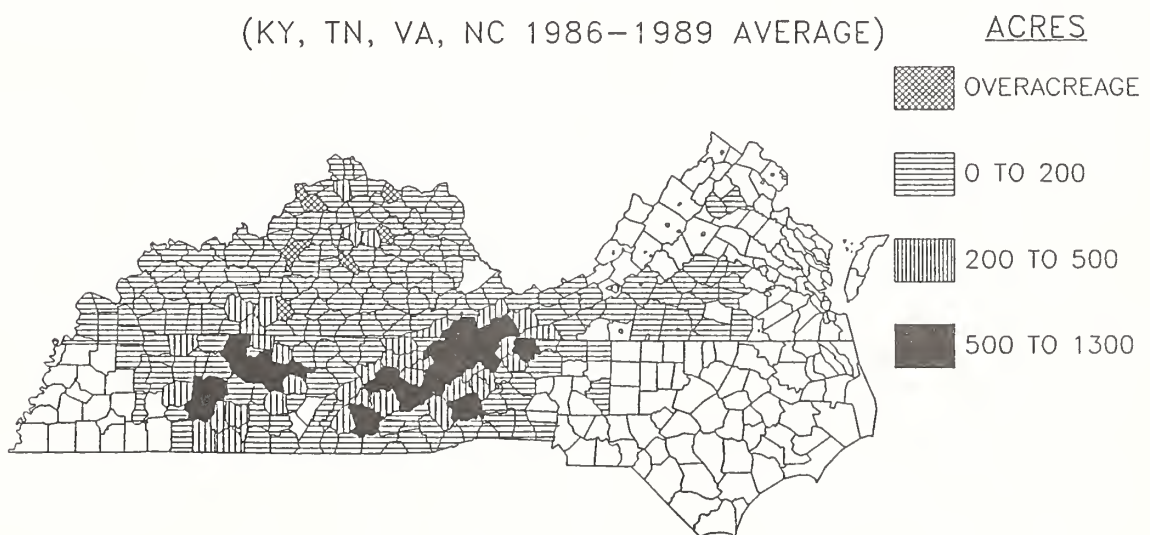
SOURCE: TOBACCO SITUATION AND OUTLOOK  
AND CALCULATIONS

FIGURE 9  
ACRES PLANTED/10,000 LBS  
OF BURLEY EFFECTIVE QUOTA

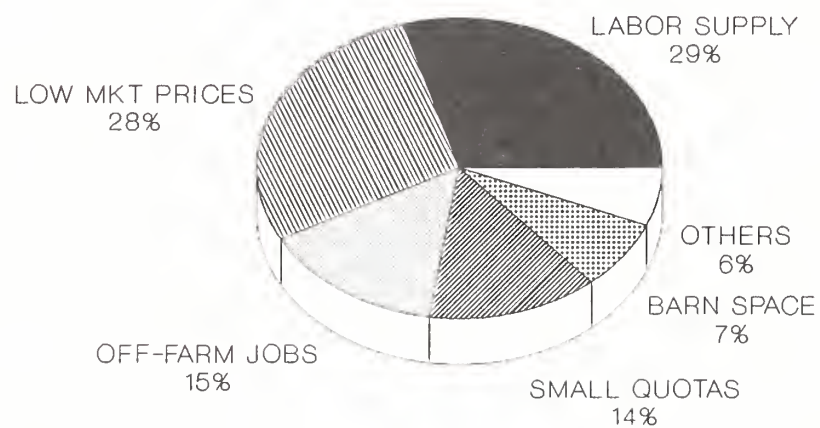


SOURCE: TOBACCO SITUATION AND OUTLOOK

FIGURE 10  
REGIONAL UNDERACREAGE OF BURLEY EFFECTIVE QUOTA  
(KY, TN, VA, NC 1986-1989 AVERAGE)



**FIGURE 11**  
**MAJOR REASON FOR UNDERPRODUCTION**



**SOURCE: 1989 KY COUNTY AG AGENTS SURVEY**



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## OUTLOOK FOR TIMBER PRODUCTS

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Few timber products are consumed by individuals in the form in which they are initially manufactured. Instead, most move to various major markets where they are remanufactured or made a part of a product that is ultimately used by individual consumers. Thus, although consumer demand is the underlying force, direct demand for timber products is largely determined by the levels of activity in their primary end-use markets.

In my talk today, I will review trends in the economy and in the major timber products markets through the third quarter of 1990 and present consensus estimates of their prospective growth in the last quarter of this year and in 1991. I will then comment on what these trends suggest as to the consumption and production of the various major timber products.

### General Economic Trends

The gross national product, a measure of the Nation's overall output of goods and services, and the most comprehensive indicator of total economic activity, rose at an annual rate of 1.8 percent to \$4,173.6 billion (1982 dollars) in the third quarter of 1990. This was well above the 0.4 percent growth rate in the second quarter and represented the economy's strongest showing since the first three months of 1989. However, despite the relatively big third-quarter rise, which was based primarily on unexpectedly large increases in consumer expenditures and business investment, the economy has been generally slowing since late in 1987. Growth through the first 9 months of 1990 averaged 1.3 percent, down substantially from the 2.3 percent annual rate in the first three quarters of 1989.

Most forecasters were surprised by the economy's unexpected show of strength in the third quarter. Available data showed that many measures of economic expansion were trending down late in the summer and analysts felt that the Middle East crisis and rising price of oil would place increasing pressures on an already slowing economy. Late in the third quarter and early in the fourth, most indicators continued to point to lower rates of economic growth in the months ahead, particularly in the industrial and construction sectors. For

example, manufacturing shipments and new orders for durable goods declined as did housing sales, while the number of jobs outside the farm sector dropped. Reflecting these trends, manufacturing production and industrial utilization rates were slowing. Retail sales also appeared to be weakening.

These continuing downward trends, along with the probability that the full adverse effects of increasing oil prices will begin to show up in the fourth quarter, have led most analysts to forecast substantially lower economic growth for the months ahead. Currently, many economists foresee negative rates of growth over the next two-to-three quarters, though most expect a relatively mild downturn. A decline of 1.2 percent in the fourth quarter would mean an average GNP for all of 1990 of about \$4,147 billion (1982 dollars), 0.7 percent above the average for 1989. Continued declines in the first half of 1991, followed by a recovery of about the same magnitude in the second half of the year would indicate about the same average GNP for 1991.

### Major Timber Product Market Trends

Construction of new housing units, which generally accounts for more than a third of United States annual consumption of softwood lumber and plywood and for substantial volumes of other softwood and hardwood products, has been trending downwards since early in the year. According to data from the Bureau of the Census, the seasonally adjusted annual rate of new housing starts fell 6 percent to 1.04 million units in October. This was the ninth consecutive monthly decline and the smallest annualized rate since 1982. As a consequence, the number of units started during the first 10 months of 1990 was about 11.5 percent below the number started in January-October 1989. Much of this decline was due to weakness in the multifamily housing sector--down nearly 21 percent--and was the result of a number of problems, including continued high vacancy rates in some areas and builder difficulty in obtaining financing. Single-family starts during the first 10 months of the year were about 8 percent below the year-earlier period.

With the continued relatively high long-term interest rates, the declining sales of new housing units, and the uncertainty surrounding the Middle East crisis, many analysts have revised their estimates of housing activity downwards from those made earlier in the year. Most forecasts currently assume a continued decline in the number of starts in last quarter of 1990 coupled with a slow recovery in 1991 if interest rates moderate. Recent estimates of housing starts for 1990 range from about 1.1 to 1.3 million units, with the current consensus at about 1.2 million units--down 12.8 percent from the volume started in 1989. Analysts' forecasts for 1991 naturally have a somewhat wider range; however, most estimates available early in the last quarter show a small improvement in the second half offsetting a weak first half and starts for the year again at about the 1.2 million level.

As a result of the relatively smaller decline in single-family starts, they are expected to account for about 76 percent of total starts in 1990, up from 73 percent in 1989. A very small increase in the relative proportion of single-family units is likely in 1991. Shipments of mobile homes, down about 5 percent from year-earlier levels through September, are likely to total about 190,000 units in 1990 and 1991.

Repair and remodeling of residential structures, another major wood products market, apparently has grown in 1990 after slowing somewhat in 1989. Through September, Bureau of the Census construction surveys show that expenditures for improvements (additions, alterations, and major replacements) averaged \$54.2 billion (seasonally adjusted annual rate, 1987 dollars), about 1 percent above expenditures during the same period in 1989. Although this was a much slower rate of growth than in the mid-1980's--expenditures rose at an annual rate of almost 12 percent between 1982 and 1988--analysts surmise that both repair and remodeling could have been adversely impacted by interest rate increases early in the year and the unsettled economic situation in more recent months. Most agree that this segment of the construction market will continue to grow in the years ahead, however short term increases are likely to be constrained by the same factors currently impacting all of the construction sector of the economy.

Total nonresidential construction activity through the first 9 months of 1990 has been stronger than during the same period in 1989. Expenditures through September averaged \$223.4 billion (seasonally adjusted annual rates, 1987 dollars), up 4.4 percent from January-September 1989. However, all of the increase was in the nonbuilding sector. Private nonresidential building construction expenditures showed an overall decline for the same period. A number of factors are apparently responsible for the drop, including, for example, the slowdown in economic growth, effects of declining housing construction, interest rate increases in early 1990, and continued high office building vacancy rates in some major urban areas. Many of these factors will likely continue to negatively affect nonresidential construction in the months ahead. As a consequence most economists expect only a slight rise in nonresidential construction expenditures for all of 1990, followed by a small decline in 1991.

The index of manufacturing production--an important indicator of the demand for pallet lumber, container board, and some grades of paper--dropped about 1 percent to a seasonally adjusted value of 110.2 (1987=100) in October. This decline came after no change in output in the third quarter and represented an overall increase of only 2 percent since January. The index of furniture and fixtures manufacture also fell in October--the fourth monthly decline since June. The October index--104.1--indicated a drop in output of about 4 percent since mid-year and 1 percent since January.

Despite the lack of sustained growth during the year, average monthly manufacturing production through October was about 1 percent above the average for the first 10 months of 1989. Furniture and fixtures manufacture in January-October was also up 1 percent over the same period in 1989. Most economists currently feel that total manufacturing output and production in many industries will decline somewhat in the months ahead if economic growth weakens as discussed earlier.

In summary, U. S. economic activity in general and many of the principal U.S. timber products markets have shown declines or somewhat lower rates of growth over the first three quarters of 1990 than in 1989. In addition, prospective trends in several of the important indicators point to continued slow growth or declines in late 1990 and early 1991. The depth and duration of any downturn is still a matter of conjecture; however, most analysts currently foresee some improvement in the second half of 1991. A turn-around in the construction markets would be a particularly positive influence on the consumption of many timber products.



## International Markets

The United States is the world's leading importer of timber products--chiefly softwood lumber, woodpulp, and paper and board from Canada, and veneer and plywood from southeast Asia. The total value of these imports in 1989 was \$17.5 billion, about 3.7 percent of the value of all U.S. imports. In terms of roundwood equivalents (i.e., the estimated amount of wood required to produce the individual products), more than a fifth of our apparent consumption of timber products in recent years has been imported.

The United States is also a major timber products exporter, the value of which is second only to Canadian shipments in world markets. In 1989, the value of our timber products exports was \$14.6 billion--about 4.2 percent of our export total. Although we ship a wide variety of timber products to many different countries, our principal export markets are Japan for softwood logs and lumber, pulp chips, woodpulp, and paper and board products, and western Europe for lumber, plywood, woodpulp, and paper and board. In recent years, China has also become an important market for softwood logs.

According to data presented at the October meeting of the Timber Committee of the Economic Commission for Europe, economic growth in some of our major European export markets has remained relatively strong in 1990, while in others the economic and political situation has caused somewhat lowered demands for timber products imports. As in the U.S., many countries remain uncertain of the possible effects of the Persian Gulf crisis and increased oil prices on their economies. In addition, in Europe there is additional uncertainty surrounding the unification of Germany and shifts of some countries to market oriented economies. Exports of logs and lumber to Japan in 1990 are both down from shipments in 1989. In addition, there has been a large decline in logs to China.

Looking forward to 1991, the likelihood is for some slowing in the exports of most products. Our major western European trading partners expect a leveling off or some easing back in their purchases as a result of the uncertainties mentioned earlier. Industry analysts expect that shipments to our major Pacific Rim markets also will be smaller than they were this year. Imports, particularly of those products used in housing construction, should show some increase in the last half of the year.

## Timber Products Production, Trade, and Consumption

### Softwood lumber

According to data from the National Forest Products Association, softwood lumber consumption in the first 8 months of 1990 was about 1.4 percent below that in the same period in 1989. Current expectations about housing and other markets indicate the likelihood of continuing declines in demand in the final months of the year. Thus consumption for all of 1990 (based on data from the U.S. Bureau of the Census) is estimated at 43.9 billion board feet, 5 percent below consumption in 1989 and down 11.5 percent from the record 49.7 billion board feet consumed in 1987 (table 1).



Table 1.--U.S. wood products production, consumption, and trade  
(1987-89 actual, 1990-91 projections)

Product	Year	Domestic production	Imports	Exports	Apparent consumption
Softwood lumber (billion bd. ft.)	1987	37.4	14.7	2.4	49.7
	1988	36.8	13.8	3.3	47.4
	1989	36.0	13.6	3.4	46.3
	1990	34.5	12.4	3.0	43.9
	1991	34.0	12.3	2.9	43.4
Hardwood lumber (billion bd. ft.)	1987	7.5	.5	.8	7.2
	1988	7.7	.4	1.3	6.9
	1989	7.5	.3	.9	7.0
	1990	7.2	.2	.8	6.6
	1991	7.2	.2	.8	6.6
Softwood plywood (billion sq. ft., 3/8-inch basis)	1987	22.3	.1	.8	21.7
	1988	22.1	.1	1.0	21.2
	1989	21.4	.1	1.4	20.0
	1990	21.9	.1	1.7	20.3
	1991	22.1	.1	1.8	20.4
Hardwood plywood (billion sq.ft., 3/8-inch basis)	1987	1.0	1.9	.1	2.9
	1988	1.0	1.6	.1	2.5
	1989	1.0	1.9	.1	2.8
	1990	.9	1.6	.2	2.4
	1991	.9	1.7	.2	2.4
Particleboard <sup>1</sup> (billion sq. ft., 3/4-inch basis)	1987	4.7	.2	.2	4.7
	1988	4.9	.1	.3	4.7
	1989	4.9	.2	.3	4.8
	1990	4.9	.2	.4	4.7
	1991	5.0	.2	.4	4.8
Hardboard <sup>2</sup> (million tons)	1987	1.7	.3	.1	1.9
	1988	1.6	.2	.1	1.7
	1989	1.7	.3	.2	1.8
	1990	1.8	.2	.2	1.8
	1991	1.8	.2	.2	1.8
Insulation board (million tons)	1987	.9	.1	.1	.9
	1988	.9	.1	.1	.9
	1989	.9	.2	(3)	1.0
	1990	.9	.1	(3)	1.0
	1991	.9	.1	(3)	1.0
Pulpwood (million cords)	1987	95.9	.4	2.0	94.3
	1988	97.5	.7	2.8	95.4
	1989	103.1	.7	3.5	100.4
	1990	104.5	.6	3.6	101.5
	1991	105.0	.6	3.6	102.0

<sup>1</sup> Includes medium density fiberboard. Imports adjusted to remove estimated waferboard shipments.

<sup>2</sup> Shipments.

<sup>3</sup> Less than 50,000 tons.

Note: The projections shown for 1990 and 1991 are based on the trends in the major markets discussed in this paper and should not be viewed as forecasts of actual volumes. Data shown are subject to rounding.

Sources: U.S. Department of Agriculture, Forest Service estimates based on data from the U.S. Department of Commerce, American Hardboard Association, American Paper Institute, American Pulpwood Association, National Forest Products Association, National Particleboard Association, and Western Wood Products Association.

Imports, nearly all from Canada, have declined somewhat over the first 8 months of 1990. Through August, total softwood lumber imports were about 7.5 percent below the similar year-earlier period. Imports during the last quarter of 1990 are likely to drop to slightly lower levels given the prospective U.S. demand situation. As a result, total imports for 1990 are expected to drop to 12.4 billion board feet, down about 9 percent from the volume imported in 1989.

Exports through the first 8 months of 1990 were down nearly 10 percent from January-August 1989. Many observers feel that this trend will continue late in the year. As a consequence, exports for the year are likely to total about 3.0 billion board feet. This would be about 11 percent less than the record level reached in 1989.

Through August, U.S. production of softwood lumber was about 0.5 percent above the first 8 months in 1989 according to information from the Western Wood Products Association. With somewhat slower markets expected in the last months of the year, production for all of 1990 should amount to about 34.5 billion board feet, 4.3 percent below production in 1989. Present expectations about housing and the other important markets discussed earlier indicate declines in production, imports, and consumption are likely in 1991.

After increasing slightly in the first quarter of the year, the price of domestically produced softwood lumber has declined fairly sharply in recent months. The October producer price index was 116.9 (1982=100), down almost 11 percent from the index for April, and only slightly above the average for 1987 (table 2). With the prospective slowdown in consumption in late 1990 discussed earlier, prices likely will not rise markedly until usage picks up after mid-year 1991.

### Hardwood lumber

Data published by the National Forest Products Association show hardwood lumber consumption through the first 8 months of 1990 down sharply from the similar period in 1989. If manufacturing markets continue at the current slow pace and furniture production does not turn around in the last months of the year, consumption, based on Bureau of the Census data, is likely to drop to 6.6 billion board feet, about 5.5 percent below the 1989 total.

Hardwood lumber imports through August were about 28 percent below those in the first 8 months of 1989 with some additional slowing expected in the last quarter. The total for the year is thus estimated at 0.2 billion board feet. Total exports for the year are expected to be 0.8 billion board feet, down from 0.9 billion in 1989.

Hardwood lumber production in 1990, based on data from the Bureau of the Census and the above estimates of consumption and trade, is projected at 7.2 billion board feet, down about 5 percent from output in 1989. Anticipated slowing in the important hardwood markets suggests that small declines in production and consumption are likely in 1991. Imports and exports also are expected to show small decreases.

Table 2.--U.S. producer price indexes for selected timber products  
(1982=100)

Product	Annual			October	
	1987	1988	1989	1989	1990 <sup>1</sup>
Softwood lumber	116.6	120.0	127.1	129.5	116.9
Hardwood lumber	126.8	131.0	128.1	128.4	131.2
Softwood plywood	109.8	109.1	124.2	141.3	108.7
Hardwood plywood <sup>2</sup>	92.9	94.2	99.8	101.0	103.7
Particleboard <sup>3</sup>	121.1	125.4	128.6	131.3	110.0
Hardboard	101.9	103.5	102.7	99.5	98.7

<sup>1</sup> Preliminary.

<sup>2</sup> Hardwood plywood and related products.

<sup>3</sup> Platen-type (mat-formed), December 1982=100.

Source: U.S. Department of Labor, Bureau of Labor Statistics.

Hardwood lumber prices have shown little variation over the past year. The October producer price index--131.2 (1982=100)--was less than one percent below the high recorded in August, and less than one percent above the average for all of 1988. Because of different market structures, prices for hardwood lumber are generally less volatile than those for softwood lumber.

### Softwood Plywood

As noted earlier, new housing construction, traditionally the most important softwood plywood market, has remained below year-earlier levels through the first three quarters of 1990. However, some of the other construction markets in which softwood plywood is widely used, such as residential maintenance and repairs and nonbuilding construction, have been relatively stronger. As a result, softwood plywood consumption apparently has increased in 1990. Total consumption in 1990 is expected to rise to about 20.3 billion square feet (3/8-inch basis), 2 percent more than was used in 1989.

Data for the first 8 months of 1990 show softwood plywood exports close to 21 percent above shipments during the similar period in 1989, with significantly larger shipments to nearly all of our major offshore markets. This upward trend is likely to slow somewhat late in the year and the total for 1990 is expected to be about 1.7 billion square feet. Imports are expected to amount to about 0.1 billion square feet.

With these levels of consumption and trade, softwood plywood production for 1990 is projected to increase to 21.9 billion square feet (3/8-inch basis), 2.3 percent above output in 1989.

For 1991, with the prospective trends in new housing construction, and the relatively slow growth in other markets, total consumption is expected to increase marginally to about 20.4 billion square feet. Exports also should show a small rise but imports likely will remain about the same volume. As a consequence, production should increase a little less than 1 percent.

Softwood plywood prices, as indicated by the producer price index, have declined 20 percent since April and more than 23 percent since their rapid rise in the fall of 1989 which was largely induced by Hurricane Hugo and the small stocks in the distribution system at the time. The October index--108.7 (1982=100)--indicated prices below the averages for 1987 and 1988 and very near those in the early 1980's. Prices will likely stay relatively soft until the construction markets turn around.

### Hardwood Plywood

Consumption of hardwood plywood in 1990 is expected to be near 2.4 billion square feet (3/8-inch basis), about 14 percent below total use in 1989. Trade data indicate that imports are likely to decline about 17 percent to 1.6 billion square feet. Exports are expected to increase to about 0.2 billion square feet, up fairly sharply from shipments in 1989. With these trends in consumption and trade, production for 1990 will total 0.9 billion square feet, about the same volume as in 1989.

Much of the hardwood plywood consumed each year is used in residential construction as well as in the manufacturing sector. As a consequence, only a very small increase in consumption and imports is likely in 1991. Exports are expected to remain close to 0.2 billion square feet.

Hardwood plywood prices, as indicated by the producer price index, have been increasing very slowly over the past few years. Although the index for October--103.7 (1982=100)--indicates prices about 12 percent above those in 1987, they are, of course, only 3.7 percent above the average for 1982.

### Particleboard and Medium Density Fiberboard

Activity in the major manufacturing markets and shipments data from the National Particleboard Association suggest that combined consumption of particleboard and medium density fiberboard in 1990 will be close to 4.7 billion square feet, 3/4-inch basis, about 1 percent below that used in 1989. Roughly a fifth of total combined consumption is expected to be medium density fiberboard.



Data from the Bureau of the Census and the National Particleboard Association indicate that exports will rise to about 0.4 billion square feet and imports remain at 0.2 billion square feet. With these estimates, production would amount to 4.9 billion square feet, about the same volume as in 1989.

Trends in the major markets, discussed earlier, suggest that very small increases in production and consumption are likely in 1991.

### Hardboard and Insulation Board

Based on industry shipments through the first 7 months of the year, hardboard production in 1990 is estimated at 1.8 million short tons, up about 6 percent from production in 1989. Data from the Bureau of the Census indicate that imports are likely to drop from 0.3 to about 0.2 million short tons, with exports remaining at 0.2 million short tons. Consumption with these estimates of production and trade, would amount to 1.8 million short tons, the same as the volume consumed in 1989.

Markets during the first 3 quarters of 1990 indicate that insulation board consumption for the year will be near 1.0 million short tons--about the same volume as was used in 1989. Imports are expected to be close to 0.1 million short tons, down fairly sharply from imports in 1989. and exports are likely to drop below 50,000 tons. Consequently, production is estimated at 0.9 million short tons, about the same as output in 1989.

With the prospective trends in housing and the major manufacturing markets discussed earlier, consumption and production of hardboard and insulation board are likely to show small declines in 1991. Imports and exports for both products will probably remain about the same as in 1990.

### Pulpwood

Over the first 3 quarters of 1990, paper and paperboard production and consumption, though following a relatively flat trend, has continued at record and near-record levels, according to data from the American Paper Institute. Through September, the annual rate of total production was up 1.8 percent from the first 9 months of 1989. As a result, pulpwood consumption was at record levels according to data from the American Pulpwood Association. If economic activity drops in the last quarter, some slowing in overall consumption is likely. On the basis of these trends, pulpwood consumption (roundwood and chips) in 1990 is expected to total 101.5 million cords up about 1.1 percent from the previous high of 100.4 million cords recorded in 1989.

Imports of pulpwood, mostly pulpwood chips from Canada, have declined from year-earlier levels through the first 7 months of 1990, according to Bureau of the Census data. As a result, imports for the year are expected to total 0.6 million cords. Exports are estimated at 3.6 million cords, about 4 percent above exports in 1989.

Pulpwood production in 1990 is expected to rise to about 104.5 million cords, 1.3 percent more than in 1989, and also a new record. The prospective trends in overall economic activity suggests that the upward trend will continue in 1991, though at much slower pace than in the past few years.

### Softwood Log Trade

Softwood log exports during the first 8 months of 1990 totaled 2.7 billion board feet, about 13 percent below the volume shipped during January-August 1989. Exports were down to most of our major offshore markets including Japan, China, and the European Economic Community. As the result of some probable slowing late in the year, exports for all of 1990 have been estimated at 3.7 billion board feet, 19 percent below shipments in 1989. Industry sources indicate that the outlook for 1991 is for a continued decline to about 3.3 billion board feet.

The prospective declines in 1990 and 1991 are based primarily on estimates of market strength in the principal importing countries. Late in the summer, legislation was enacted that placed a permanent ban on export of softwood logs from lands in the contiguous States west of the 100th meridian managed by Federal agencies. It also prohibits the export of logs from lands in the same area managed by State and other public agencies. The ban is total in States exporting less than 400 million board feet annually, but permits export of 25 percent of State and other public harvest for those exporting 400 million or more. Only the State of Washington currently exports more than 400 million board feet annually. It is still too early to gauge the effects of these bans on total softwood log exports.

Softwood log imports were down sharply through late summer and are likely to total about 15 million board feet, roughly two-thirds the volume imported in 1989.

### Hardwood Log Trade

Hardwood log exports for 1990 are estimated at 0.2 billion board feet. Although the volume is relatively small, most of the logs exported in 1990 and in recent years have been high quality oak, walnut, and other species prized for their use in the manufacture of fine furniture and cabinetry. As a consequence, they constitute one of our most valuable timber products exports on a per unit basis.

Hardwood log imports in 1990 are expected to be close to 15 million board feet.

### Industrial Roundwood Summary

Given the trends in consumption, trade and production in 1990, total consumption of all industrial roundwood products (i.e., all roundwood products except fuelwood) is expected to be about 15.9 billion cubic feet, 2.5 percent below use in 1989 and 4 percent less than the record volume consumed in 1987. Production, imports, and exports likely will also be below year-earlier levels. Consumption, imports, exports, and production will likely to continue to decline in 1991 if the major markets follow the trends discussed earlier.

## Fuelwood

Studies have shown that in the short run, fuelwood consumption largely is determined by such factors as the prices of alternate fuels and weather conditions during the heating season. Current estimates indicate the rapid growth in the consumption of fuelwood seen in the late 1970's and 1980's slowed as the prices of fossil fuels peaked and then declined. Based on available data, fuelwood consumption in 1990 is estimated at about 42 million cords, very near estimated consumption in 1989. Some analysts speculate, however, that consumption is likely to accelerate in 1991 and subsequent years if the prices of petroleum based heating fuels continue the recent increases caused by the Middle East crisis.

Much of the wood used for domestic heating and cooking in the United States is cut by the consumers themselves from trees in urban areas, fence rows, dead forest trees, and other sources not normally drawn upon for industrial timber products. Most of that used by forest industries comes from utilization of logging residues and mill byproducts.

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## IMPACTS OF U.S. FOREST MANAGEMENT POLICIES ON THE CARBON CYCLE

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### ABSTRACT

The conversion of cropland, pasture, and poorly-stocked forest to plantation forests may result in a net decrease in atmospheric carbon dioxide through increased carbon sequestration. To analyze the potential changes, carbon storage over time for various land uses and forest types has been estimated, including estimates of carbon storage in trees, soil, the forest floor, and understory vegetation. Most of the opportunities for land use conversion are in the South. There it is estimated that the greatest potential for increasing carbon sequestration is by converting cropland to plantation forest, followed by converting pasture to plantation forest. Converting poorly-stocked forest to plantation forest may result in a net decrease in carbon sequestration.

### INTRODUCTION

This paper provides some background information for assessing forestry opportunities in the United States to mitigate the effects of global warming. Of particular interest are the opportunities for converting crop and pasture lands to plantation forests and the opportunities for converting poorly-stocked forests to well-stocked plantation forests. These opportunities are commonly mentioned as likely to produce a net increase in carbon storage in forests, and are the main elements of the rural tree planting initiative of the U.S. President's "America the Beautiful" program.

The purpose of this paper is to estimate the amount of carbon stored in forest ecosystems over time, including carbon stored in trees, understory vegetation, litter and other organic matter on the forest floor, and soil. The yield table approach, long used in forestry applications for estimating timber volume, was selected as a convenient way to quantify carbon dynamics for the various forest ecosystem components. The carbon storage tables form the basis for making comparisons that describe the net expected changes in carbon storage for any point in the future.

Carbon storage tables have been derived for many of the common forest types and plantation species in the U.S. This paper focuses on the Southern U.S. where many of the land conversion opportunities are located. Related



papers, especially those sponsored by the American Forestry Association's study "Forestry Opportunities in the United States to Mitigate the Effects of Global Warming", will expand this work to cover opportunities across the whole U.S.

#### METHODS

Carbon storage and accumulation was estimated separately for several forest ecosystem components: trees, soil, forest floor, and understory vegetation. The definitions of these components were broad enough to include all sources of carbon:

<u>Forest Component</u>	<u>Definition</u>
Trees	All above- and below-ground portions of all live and dead trees, including the merchantable stem; limbs, tops, and cull sections; stump; foliage; bark and rootbark; and coarse tree roots (greater than 2 mm).
Soil	All organic carbon in mineral horizons to a depth of one meter, excluding coarse tree roots.
Forest floor	All dead organic matter above the mineral soil horizons, including litter, humus, and other woody debris.
Understory vegetation	All live vegetation except that defined as live trees.

Carbon storage was estimated in a four-stage process corresponding to these four major forest ecosystem components. Separate estimates were developed for reforestation of cutover forest, cropland, and pasture. Separate estimates were developed for major forest types and plantation species in 8 geographic regions. In the South, separate estimates were developed for 5-year age classes through 100 years and for high and medium site classes. Site classes were based on productivity of merchantable wood.

#### Carbon Storage in Trees

Merchantable, live-tree volume yields were converted to tree carbon storage in a two-stage process. First, merchantable live-tree volume was converted to total forest tree volume by multiplying by a ratio to account for the additional volume excluded from merchantable volume: tops and branches, foliage, rough and rotten trees, small trees (less than 5.0 in. dbh), standing dead trees, stump sections, roots, and bark. Separate ratios were computed for softwoods and hardwoods to account for differences in the average proportion of total volume to merchantable volume. Ratios were derived from two principal sources: a new nationwide biomass study prepared by the USDA Forest Service containing the latest estimates of above-ground biomass by tree component (Cost et. al. 1990), and a special report prepared by Koch (1989) containing estimates of the proportion of below-ground tree volume. Separate ratios were derived for each of the regions to account for differences in tree form, and to

be consistent with the data used to develop the merchantable volume yield tables.

The second step involved converting total tree volume in cubic feet to carbon in pounds. Separate factors were developed for major forest types, for softwoods and hardwoods within each forest type, and for broad geographical regions. The volume-to-carbon conversion factor was computed in two steps. First, volume in cubic feet was converted to biomass in dry pounds by multiplying the number of cubic feet times the mean specific gravity times the weight of a cubic foot of water (62.4 lbs.). A weighted mean specific gravity for softwoods or hardwoods was estimated from the relative frequency of the 3 predominant hardwood or softwood species in each forest type and region. The second step was to multiply the biomass in dry pounds by a factor to account for the average carbon content of the tree. Estimates of the carbon content of trees used in past studies have generally ranged from 45 to 50 percent (Houghton et. al 1985); however, Koch (1989) found that, for the U.S. as a whole, the average percent carbon for softwoods was 52.1 and for hardwoods was 49.1, with some slight regional variations.

#### Carbon Storage in the Soil

To estimate carbon storage in forest soils, a regression model was developed to relate soil carbon in relatively undisturbed, secondary forests to temperature and precipitation. The method was an extension of the model developed by Burke et. al. (1989) for soil organic carbon in cropland and pasture in the Central Plains grasslands and adjacent areas. This allowed the development of compatible estimates of soil carbon for cropland, pasture, and forest.

The data in Post et. al. (1982) were used to estimate regression coefficients for forest lands. They used published sources of data to estimate mean soil carbon density for all of the life zone groups of the Holdridge life zone system (Holdridge 1967). To estimate regression coefficients for forest lands, the mean soil carbon densities were associated with the average precipitation and biotemperature for each of the life zone groups as read from the Holdridge life zone chart.

To apply the regression equations to the U.S., temperature and precipitation averages for each state were estimated from published weather records (Ruffner and Bair 1987). State-level estimates of temperature and precipitation were aggregated to the regional level by weighting the individual state estimates by the area of timberland.

For developing estimates of soil carbon for different age classes, it was necessary to make some assumptions about when this level of forest development would be reached after harvest or retirement of agricultural land. Assumptions previously made by Houghton et. al. (1983, 1985) were the basis for assumptions used here. On harvested forest land, 20 percent of the soil carbon was assumed lost by age 10 in the South and age 15 elsewhere, after which natural levels would be reached at age 50 in the South and age 55 elsewhere. Natural levels were assumed to be the levels associated with the data from Post et. al. (1982). For replanted pasture, soil carbon at age 0 was the level estimated

with the equation from Burke et. al. (1989), and natural levels were assumed at age 50 in the South and age 55 elsewhere. For replanted cropland, soil carbon began at the level estimated by Burke et. al. (1989) and reached natural levels at age 60 in the South and age 65 elsewhere. In all cases after reaching natural levels, the rate of accumulation of soil carbon was assumed to taper off slowly as the forest matured.

#### Carbon Storage on the Forest Floor

Estimates of the amount of carbon or organic matter on the forest floor are available for very broad forest classifications (Schlesinger 1977, Vogt et. al. 1986) and for very specific ecological types. These sources were used to estimate carbon in the forest floor for key age classes, and coupled with certain assumptions, were the basis for deriving estimates for the other age classes. For regional carbon storage, the estimates of Vogt et. al. (1986) for broad forest ecosystems were applied to the broad forest types common in the regions selected for converting tree volume to carbon. These reference estimates were assumed to be representative of relatively undisturbed, secondary forests.

For reforestation of cropland or pasture, it was assumed that there was no organic matter on the forest floor at age 0, and that the reference estimates were reached at age 50 in the South and age 55 elsewhere. For cutover forest land in the South, it was assumed that there was no organic matter on the forest floor after harvest because of the general use of intensive site preparation prior to planting. Elsewhere, it was assumed that the quantity of organic matter on the forest floor was equal to 33 percent of the reference estimate after harvest. After reaching the reference estimates at age 50 or 55, organic matter was accumulated on the forest floor at a decreasing rate.

#### Carbon Storage in the Understory

The understory comprises such a small percentage of the total carbon stock in forests that it is often ignored or added to the trees in estimates of all live vegetation. Estimates of understory biomass are generally available only from published results of ecological studies of specific forest ecosystems.

Here it was assumed that there was no carbon in the understory at age 0, and that understory biomass peaked at age 5 for all regions and forest types. Estimates from the literature were used for understory carbon at age 5, although references for this age class were very sparse. Then it was assumed that understory biomass declined to a reference level by age 50 in the South and age 55 elsewhere. Reference levels were defined as 2 percent of the carbon in the overstory, except for Douglas fir and red pine, for which a value of 1 percent was used. Understory carbon remained at the assumed percentage of the overstory for the remainder of the yield projection.

#### OVERVIEW OF CARBON STORAGE AND DYNAMICS IN U.S. FORESTS

U.S. forest ecosystems contain approximately 52 billion metric tons of carbon. This amounts to about 4 percent of all the carbon stored in the world's forests (Atjay et. al. 1979). In the U.S., 59 percent of all carbon



stored in forest ecosystems is found in the soil, 31 percent in live and dead trees including coarse tree roots, 9 percent in other dead organic material above the soil surface, and 1 percent in the understory vegetation. In live trees, merchantable bole portions account for about 51 percent and the roots about 17 percent of all carbon. The remainder is in other solid wood, small trees (less than 12.5 cm diameter at breast height), and foliage.

Carbon storage in trees in U.S. forests is increasing at an annual rate of approximately 106 million metric tons per year which is equivalent to about 9 percent of total U.S. emissions of carbon to the atmosphere. This estimate is based on an excess of carbon accumulation over removals for roundwood timber products, logging residues, and other tree removals such as landclearing. Total carbon accumulation in trees is approximately 461 million metric tons per year, and removals total about 355 million metric tons per year.

For analyzing expected changes in carbon storage due to forestry changes, estimates of carbon storage by age classes were prepared for major U.S. forest types and plantation species. The results of the estimation process for loblolly pine in the Southeast and spruce-fir in the Northeast are presented in figure 1. Although the total carbon is roughly the same for the two forest types from about ages 45 to 75, the carbon in the various components is quite different. Carbon in the soil and forest floor comprises a much higher percentage of the total carbon in the Northeast than in the Southeast, and there are corresponding differences in the carbon stored in trees. These results are reasonable and consistent with the known relative growth rates of trees for the two forest types, and with the slower decomposition rates associated with the colder climate of the Northeast.

The carbon estimates can be used to analyze carbon dynamics over one or several rotations, or to analyze the conversion of one forest type or age class to another. A comparison of a loblolly pine plantation that is clearcut on a 35 year rotation with a spruce-fir forest that is clearcut on a 65 year rotation shows quite different carbon dynamics (figure 2). When using these generalized, regional carbon estimates it is important to recognize that they represent average conditions over a large geographical area. For specific forest areas, estimates of carbon storage and accumulation for each the 4 ecosystem components are actually quite variable. For example, it is known that soil carbon varies with soil texture, yet this variable was not a part of the model.

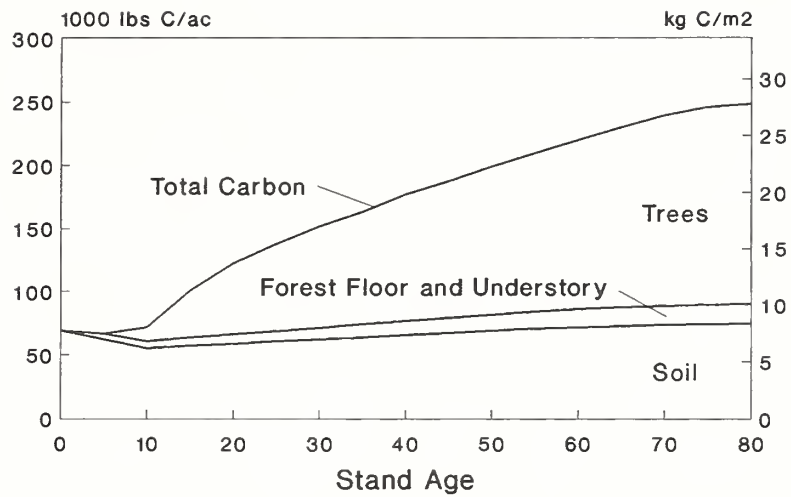
#### PROSPECTIVE CARBON CHANGES FROM CONVERTING LANDS TO PLANTATION FORESTS IN THE SOUTH

##### Conversion of Cropland and Pasture to Plantation Forest

It has been estimated that the South contains about 22 million acres of marginal cropland and pasture that could be converted to forest and produce a higher financial return than in their best crop or pasture use (USDA Forest Service 1988). This is one of the most profitable forestry investment options in the South since expensive site preparation is not usually needed. There are millions of additional acres that could be converted to forest if financial incentives were offered to landowners.



## Loblolly Pine Plantation



## Spruce-fir Natural Regeneration

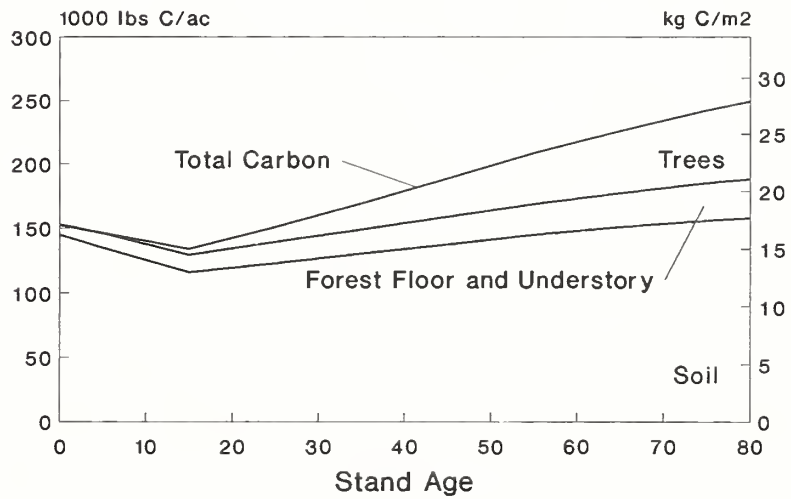
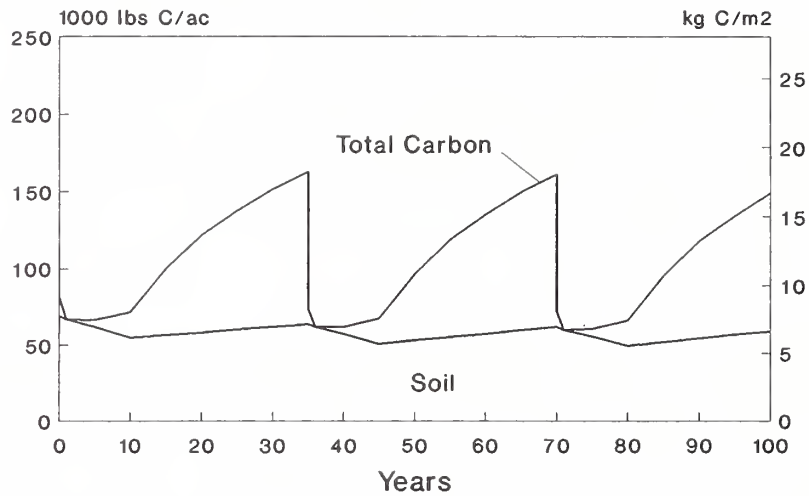


Figure 1. Carbon storage by forest ecosystem component for a loblolly pine plantation in the Southeast and a spruce-fir forest in the Northeast. Both are forests that have been clearcut and regenerated.

## Loblolly Pine Plantation



## Spruce-fir Natural Regeneration

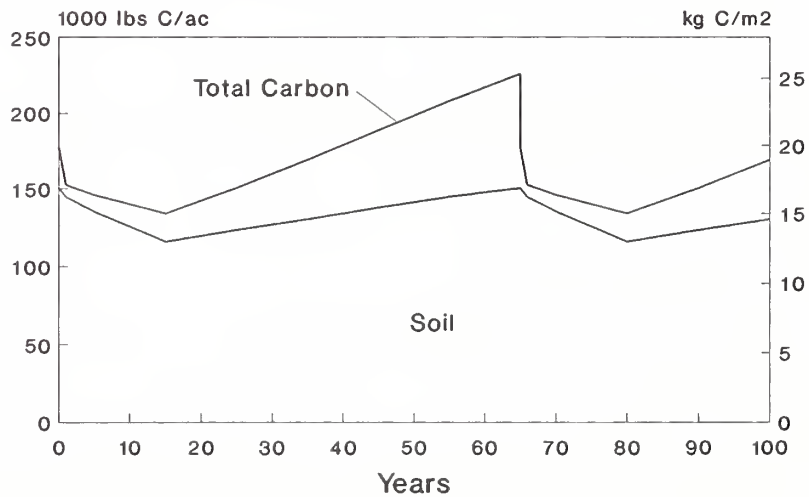


Figure 2. Soil carbon and total carbon for a loblolly pine plantation on a 35-year rotation and a spruce-fir forest on a 65 year rotation.

Conversion of cropland and pasture to forests would have an immediate effect of reducing atmospheric carbon through the conversion of carbon dioxide to carbon in tree biomass, and the buildup of additional carbon stores in the soil, forest floor, and understory vegetation. After 50 years, a typical pine plantation on converted cropland would contain 22.3 kg/m<sup>2</sup> of carbon, compared to 2.5 kg/m<sup>2</sup> of carbon on cropland. A typical pine plantation on converted pasture would contain 19.5 kg/m<sup>2</sup> of carbon, compared to 3.7 kg/m<sup>2</sup> of carbon on pasture. These are clearly large average increases that, if applied to 22 million acres of southern land, would result in a net increase of about 1.6 billion metric tons over 50 years, or 32 million metric tons per year.

#### Conversion of Poorly Stocked Timberland to Plantation

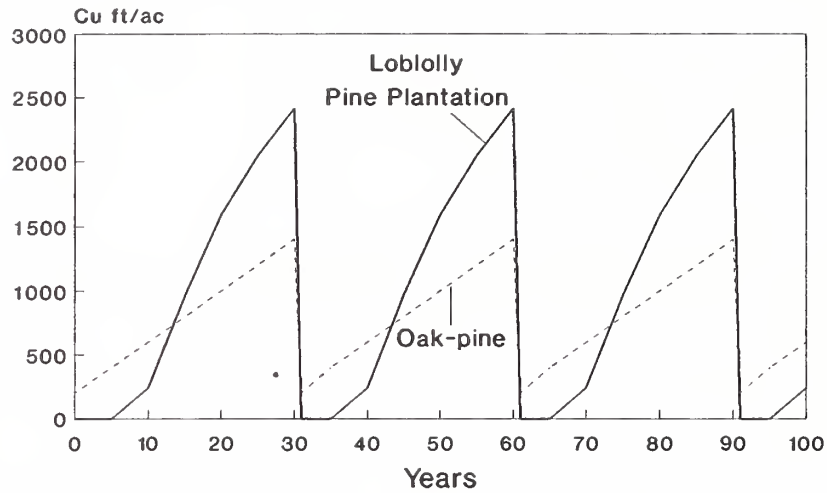
In a recent study of southern timberlands, it was estimated that about 28.8 million acres of timberland were poorly stocked and could be more productive if regenerated to pine plantations (USDA Forest Service 1988). This large area lacks manageable stands of timber because of inadequate growing stock. If left alone, these stands would grow at a rate considerably below potential. This land includes areas with few trees, cutover stands with residual stocking of rough and rotten trees, and stands that have had a long history of partial cutting to remove merchantable trees.

A typical poorly stocked forest in the South would contain less than half of the tree stocking of a fully-stocked forest, including about one tenth of the stocking of growing-stock trees (currently or prospectively merchantable trees) and 3 times the stocking of rough and rotten trees. Conversion of a poorly stocked forest to a fast growing pine plantation would result in a substantial increase in the production of merchantable volume, and over a 100-year period would yield about twice the volume of timber products (figure 3). A comparison of carbon storage in the forest ecosystem, however, shows that the conversion to pine plantation would result in a net loss of carbon stored in the forest (figure 3). The reasons that big gains in merchantable volume are not always proportional to gains in total carbon storage are that (1) rough and rotten trees will also accumulate carbon, (2) stocking will increase (approach normal) over time, and (3) regeneration or conversion disturbs the site and reduces carbon in the soil and forest floor.

The comparison of carbon storage is slightly more favorable if the carbon stored in wood products from harvested timber and in landfills from waste and product retirement is added to the total. The increased merchantable volume in the pine plantation results in higher storage in wood products and landfills, so that the comparison for the average poorly stocked stand slightly favors the pine plantation at the end of the rotation (figure 4).

To get a significant gain in carbon storage would require converting acres that have less stocking than the average poorly stocked stands. These areas would typically be dominated by offsite, diseased, or otherwise unproductive trees. If it is assumed that the poorest of the poorly stocked stands grow at one-half of the average rate, then the comparison of total carbon storage shows a significant gain from converting poorly stocked forest to plantation forest (figure 4). Gains of this magnitude, if applied to half of the poorly stocked acres in the South (14.4 million acres), would result in a net gain of roughly

## Merchantable Volume Comparison



## Comparison of Forest Carbon Storage

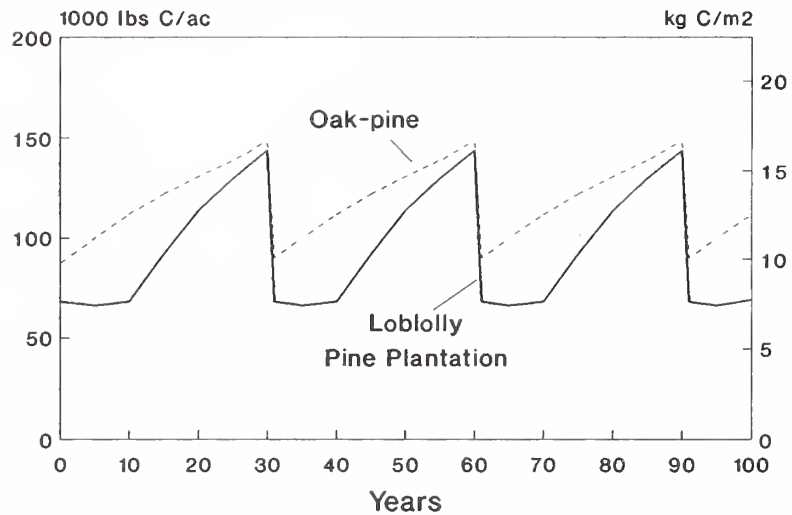
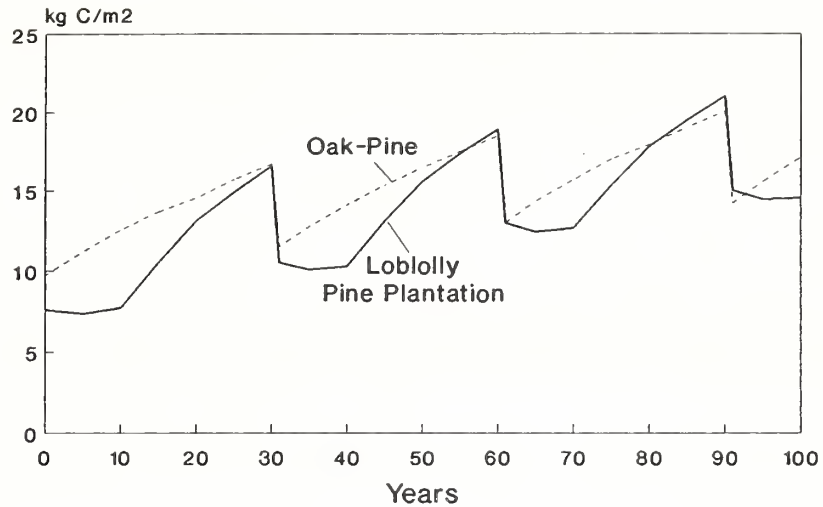


Figure 3. Comparisons of merchantable volume and forest carbon storage in a poorly stocked oak-pine forest and a fully stocked loblolly pine plantation on a 30-year cutting cycle. The oak-pine forest has been cutover and has an initial stand age of approximately 30 years.



### Average, Poorly Stocked Oak-Pine



### Below Average, Poorly Stocked Oak-Pine

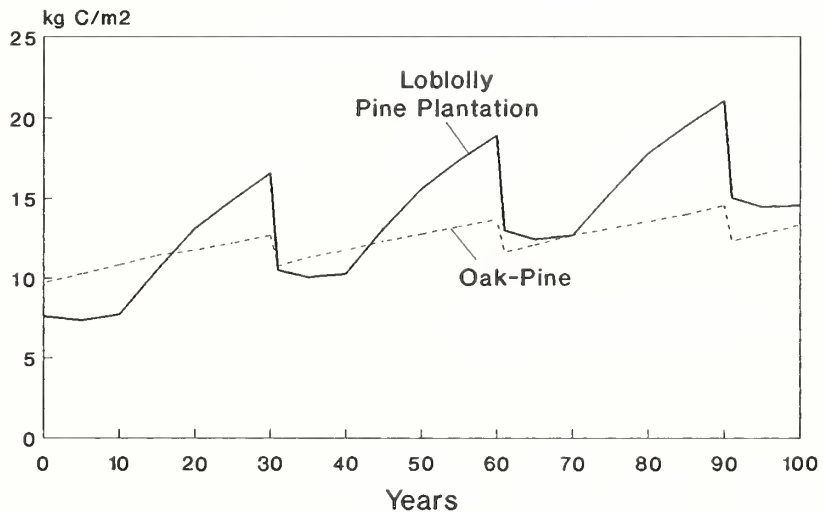


Figure 4. Comparisons of total carbon storage in a poorly stocked oak-pine forest and a loblolly pine plantation on a 30-year cutting cycle. Carbon stored in wood products and landfills after harvesting from the forest is included. The top chart shows an average, poorly stocked oak-pine forest; the bottom chart shows a below average, poorly stocked oak-pine forest.

210 million metric tons of carbon after 50 years. This amounts to 13 percent of the gain from planting trees on available cropland and pasture in the South.

#### CONCLUSIONS

From this analysis it can be concluded that the potential gains from converting land to plantation forest are clearly greater on cropland and pasture than on poorly stocked forest. If carbon storage were the main criteria, it would only make sense to convert the poorest of the poorly stocked forest land, since existing residual stocking plus newly established trees would produce nearly as much carbon in the average poorly stocked stand as in a pine plantation.

If the opportunities described here for the South were implemented on 22 million acres of cropland and pasture, and 14.4 million acres of poorly stocked forest, a net gain of 1.8 billion metric tons of carbon storage could be expected over a 50 year period. This would average 36 million metric tons per year, equivalent to 34 percent of the current annual increase in carbon storage on all U.S. forest lands. This can also be compared to the net annual emissions of carbon dioxide to the atmosphere in the U.S. of about 4.4 billion metric tons. An annual increase of 36 million metric tons of carbon storage in forests would offset 132 million metric tons of carbon dioxide emissions, or 3 percent of the total U.S. emissions.

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# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## CARBON CYCLE IMPACTS OF FUTURE FOREST PRODUCTS UTILIZATION AND RECYCLING TRENDS

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### ABSTRACT

Improved forest products utilization and recycling would significantly increase the carbon sequestered in long-term uses such as buildings, furniture, and other manufactured products (wood-in-use sinks) and in landfills. Correspondingly, the amount of carbon returned to the atmosphere from burning manufacturing residues and from decomposition would decrease. As expected, the annual volumes of timber cut would also be significantly reduced.

Newly developed computer analysis methods can estimate detailed impacts of the harvest and use of wood on the carbon cycle (Row and Phelps 1990). The methods trace the flows of carbon from various types of harvest through harvesting, processing, use, and disposal phases into long-term wood-in-use and landfill sinks, or back to the atmosphere through decay and burning, both with and without energy generation.

### INTRODUCTION

The research is one aspect of a program to develop analytical approaches for quantifying forest-related carbon flows and sinks and for evaluating potential forestry programs to mitigate projected global climate changes. The program is being coordinated by the American Forestry Association, and is supported by the USDA Forest Service, the U.S. Environmental Protection Agency, and other organizations. This research employs existing models and information on land use, forest growth and yield, and forest product sector production and markets in the United States.

This research program is intended to aid in (a) evaluation of policies and programs to mitigate the atmospheric carbon accumulation that may increase global warming, (b) development of program guidelines to achieve the most efficient balance between carbon sequestering and other program benefits and costs, and (c) estimation of impacts of potential technological developments in forestry and forest product utilization on the carbon cycle.



A major feature of the computer methods is the capability to simulate carbon flows from harvesting dissimilar species and tree sizes for various products and regional markets. This permits tailored analysis of specific timber harvests involved in programs and policies.

This paper first discusses the current trends in wood utilization through the successive stages of processing and use of harvested forest products. The computer methods developed are then used to estimate the impacts of further improving utilization practices and of increasing wood products recycling.

#### CARBON FLOWS IN THE WOOD UTILIZATION CYCLE

Timber harvest, utilization, and final disposition of carbon can be traced through 5 transformation phases: (1) trees to roundwood products; (2) roundwood products to rough and then to finished solid wood and fiber products (such as lumber, plywood, and pulp); (3) solid wood products and pulp to various end uses that act as wood-in-use carbon sinks, such as construction, factory manufactured products, and paper and paperboard; (4) wood-in-use to various disposal modes--landfills, burning, and decomposition; and (5) from the disposal modes back to the atmosphere.

The transformations modeled in the first three phases (harvest to wood-in-use carbon sinks) usually take place within a few months or years. Thereafter the lumber, plywood, pulp fiber and other wood products remain in houses, furniture, newspapers, and other wood-in-use sinks for varying lengths of time. Some wood material (and carbon) remains in landfills long after.

The final outputs of the analysis are schedules of carbon returned to the atmosphere through direct emission due to decomposition, and through burning, with and without energy production. Also shown are the amounts of carbon remaining in the wood-in-use sinks and in landfills. All data are calculated for successive 5-year periods for up to 100 years after harvest--the length of time carbon cycle processes are largely completed.

#### UTILIZATION TRENDS IN PROCESSING AND USE PHASES

Current utilization and recycling trends in each of the 5 phases of use of harvested wood are:

Phase 1--Stand harvest. This phase starts with timber stand harvest and converts the trees to roundwood products--sawlogs, veneer or peeler logs, pulpwood, piling and other products. Roundwood product specifications and merchantability, as well as tree size, taper, bark thickness, and presence or absence of cull (rotten or defective wood), determine the kinds and amounts of roundwood products cut from a tree.

The current trends in improving utilization in harvesting include:

\* Using more of the tree for useful products. Generally this includes cutting more than one type of roundwood product, such as veneer

logs, sawlogs, and pulpwood from the same tree. Log cutting, or "bucking", can be done at the logging site, but is increasingly done at separate facilities or "merchandisers" after the trees are hauled full-length from the woods.

- \* Using all species of trees from the logging area and intended to be cut. This often includes trees in the understory that once would have been cut and left to decay at the site.

The result of these improvements is that less than half of the logging residues are left in the woods as was common just several decades ago. In some areas, the only logging residues left are branches and small tops.

Phase 2--Logs into products. The analysis traces the flows of fiber and carbon from roundwood, manufacturing byproducts, recycled products, and other sources to finished products used in construction and manufacture. As shown in figure 1, the transformation into some finished products, such as plywood, surfaced lumber, and paper, occurs in several manufacturing processes before the products are ready for final market use. For some roundwood products, such as fuelwood, processes may be relatively simple or rudimentary.

The major trends in utilization in product processing are:

- \* Improvements in equipment and methods that cut higher yields of lumber and veneer (and then plywood) from logs with less residues. These improvements include thinner saws and better dimension control, smaller cores in turning veneer logs, and better drying, planing, and sanding techniques. Computer control of processing has improved average quality or grade recovery, as well as volume yields.

- \* Using residues and low-value wood for composite and pulp materials. Coarse residues, such as edgings, trimmings, and veneer cores have long been chipped for pulp chips, as have dry shavings, turning waste, and other residues been used for particleboard. A major new product is oriented strand board (OSB), including waferboard, used in place of plywood. Most OSB and waferboard is made from wood chipped for its manufacture, though high-quality large chips and other byproducts can be used. The bark and much of the unused residues are generally burned for energy.

- \* Technological change in pulp and paper manufacture has been profound. Important advances are new pulping and paper-making methods that allow greater product recovery from raw materials. This has led to increasing use of both soft and hard hardwood species. Manufacturing techniques have allowed strong papers to be made from pulps not previously used, extending raw material supplies. Black liquor from pulping is now universally burned for energy production and chemical recovery.

- \* The use of wastepaper for recycling has substantially increased during the last decade. The major current limitation on use of recycled paper in the U.S. is the shortage of de-inking and reprocessing capacity. Much of the paper now collected for recycling is exported to the Far East and Europe.

Figure 1

## ROUNDWOOD PROCESSING

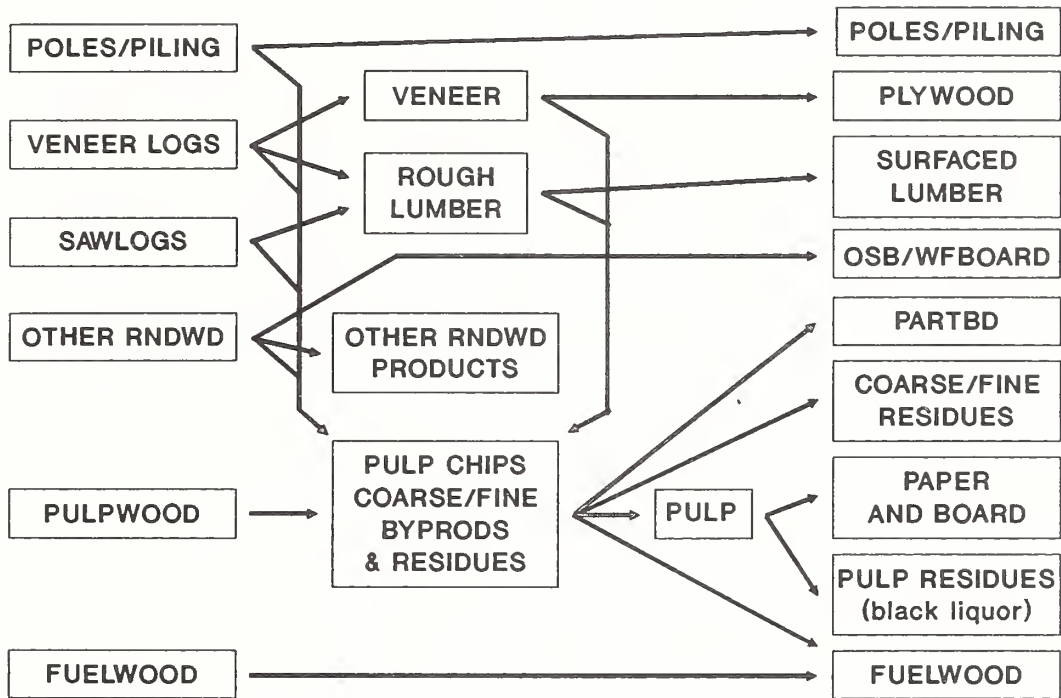
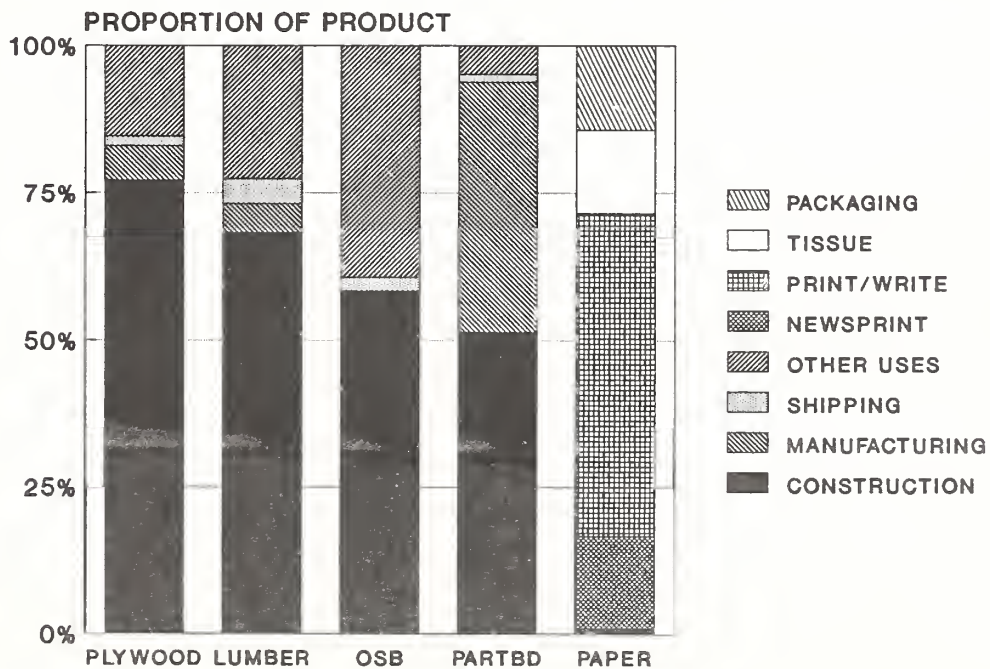


Figure 2

## WOOD PRODUCTS UTILIZATION FACTORS





Phase 3--Wood production to end uses. This phase of the analysis distributes the volumes of the various primary wood products among end uses (final markets) according to national wood use factors in Haynes (1988a), supplemented by specially compiled data. Figure 2 shows the percentage end-use distribution of five of the seven types of wood products considered. Wood use in construction is further subdivided into single-family and multifamily housing, mobile homes, residential upkeep and improvement, and nonresidential construction.

The major current trends in final uses of wood cover a wide variety of innovations in construction and manufactures. Among them are:

- \* Replacements of one material for another still occur in home construction, but many substitutions are now composite wood materials for other solid wood materials, such as OSB for plywood as roof and other sheathing. In manufactures, wood is still being replaced by plastic and metal components, though domestic wood species are regaining material market shares in furniture.

- \* Use of engineered components, such as roof and floor trusses, and entire wall and roof panels. These components are assembled in off-site factories and shipped to the construction site. Components save considerable wood volumes, and generally can use lower quality materials.

- \* Return to older and more traditional house designs, with more elaborate roof and wall layouts, and greater use of wood for decorative effects and built in features. In some sections of the country, widespread incorporation of cathedral ceilings with beams is changing wood use patterns.

- \* In wood manufactures, efficiency of material utilization is being steadily increased by greater use of glued-up stock, computerized cut-up operations, and closer recovery of waste and residues.

By the end of the phase 3 transformations into final end-use markets, about half of the original wood and bark (and therefore carbon) harvested is incorporated in wood products and half is residue or waste that has been burned, landfilled, or otherwise disposed. The largest volumes of residues are generated in solid wood products and pulpmill manufacturing and nearly all of the residue in these facilities is burned for energy. Currently, about two-thirds of the process energy required by solid wood products mills and one-half that used in pulp mills comes from burning residues (U.S. Dept. of Energy 1988).

Phase 4--End-use markets to disposal modes. This phase estimates the rate at which the wood products (and carbon) in each end-use sink are retired from use. The average half-lives for the twelve final end-use markets recognized vary from an estimated 67 years for nonresidential construction to less than 1 year for newsprint and packaging paper and board. Relatively few of the items or buildings will just last the average life. For most of the



wood product sinks, the retirement of individuals from the group can be expected to rise slowly initially, accelerate during the years around the average half-life period, and thereafter continue but at slowing rates. Some individuals in the group could be expected to remain in use indefinitely as historic buildings, heirlooms, antiques, or even museum objects.

Length of life and disposal rates have not changed as much as other aspects of wood utilization. But several trends are noteworthy:

- \* Loss of useful life due to decay has declined, as most wood that is exposed to weather or soil is pressure-treated with preservatives. Applications that are now common include landscaping timbers, decks, and even all-wood foundations.

- \* Modern restoration techniques, ranging from insulation, replacement windows, doors, and cabinetry, to ingenious heating/air conditioning, allow rehabilitation of older buildings ranging from "this old house" to centuries-old warehouses and factories. A wide range of historical buildings, which retain sound structures and have new modern uses, are being restored--or "recycled".

- \* The rate of replacement of housing for transportation, urban renewal, and multifamily residential construction seems to have slowed. This has been the major cause of loss of structures in the past.

Phase 5--Disposition to atmosphere or landfills. After retirement from the various wood-in-use sinks, the wood-based materials are recycled, sent to landfills, burned with or without energy production, or allowed to decompose. The distribution of materials among the various disposal modes are based on factors derived from several recent solid-waste studies (Franklin Associates 1988; U.S. Environmental Protection Agency 1988).

Landfilled wood materials present a special case because they are further stored and their carbon is released relatively slowly as both carbon dioxide and methane, an atmospheric gas more damaging to the global climate. Such emissions are assumed to be a constant percentage--estimated at 0.5 percent a year--of the carbon mass contained in the landfill (Noble et al. 1989). Using this rate, the peak carbon mass in landfills from the harvest is reached in about 70 years, assuming an average mix of wood products.

Even trends in material disposition patterns are having major impacts on carbon flows:

- \* Municipal solid waste is going increasingly to modern sanitary landfills. New landfill regulations will result in the material being essentially entombed for eternity after limited decomposition.

- \* Many cities are turning or returning to incineration to reduce the amounts of solid waste hauled to landfills. Modern incineration techniques, plus recycling, insure that the resulting air pollution,

especially of metals and other toxic products, is within environmentally safe limits.

\* Recycling, especially of paper, has reduced the amount of materials going to landfills. This has been mentioned as a major change in the raw material mix for paper. With emphasis on recycling in municipal solid waste management in many cities, recycling will greatly increase in coming years.

This final analysis phase estimates, for each five year period after the timber harvest, the amount of wood carbon which: (1) remains in wood-in-use sinks, (2) is entombed in landfills, (3) has so far been burned for energy and returned to the atmosphere, or (4) has been returned to the atmosphere from free-burning, from decomposition processes, or from landfills.

The results of an analysis of the disposition of wood carbon from three typical southern pine timber stands harvested at 20, 30, and 60 years of age is shown in figure 3. As can be seen, much of the carbon is still in wood-in-use sinks after five years, but relatively little remains after 100 years. The patterns of disposition of harvests of difference age stands differ significantly. Trees in 30-year old stands are cut largely for pulpwood (and thus for shorter lived products), and more of the carbon is burned, both for energy and non-energy purposes. More of the trees cut at 60 years of age go into solid-wood products, remain in use longer, and are less likely to be burned. The differences in the disposal patterns caused by harvest age appear somewhat less pronounced as time after harvest increases.

#### CARBON CYCLE IMPACTS OF RECYCLING AND UTILIZATION IMPROVEMENTS

These trends in utilization technology and recycling are expected to continue and, in some instances, to accelerate. Several are described in detail in research related to the U.S. Forest Service's most recent analysis of the United States timber situation (for example see: Skoq et al. 1989; Ince et al. 1989; Howard et al. 1989, Durbak et al. 1989). The aggregate effect of various improvements and recycling are summarized in Haynes (1988b). These studies suggest that substantially less timber will be needed to furnish raw material for projected final product demands and exports.

In addition, the improvements may also affect the proportions of carbon harvested that would be held in wood-in-use sinks and landfills, and consequently returned to the atmosphere, with or without substituting for fossil fuels. To illustrate these impacts on the wood carbon cycle, the analytical methods were calibrated for product recovery levels for the year 2040. The 2040 levels were derived from Haynes (1988a).

The revised coefficients assume continuation of technology and investment trends that will increase product recovery 24 percent for lumber, 23 percent for plywood, and 14 percent for pulp between the base period (the late 1980's) and 2040. In addition, a doubling of paper and board recycling was assumed. Carbon flows and disposition were then again simulated for the typical

Figure 3

## DISPOSITION OF CARBON BY AGE OF STAND AT HARVEST

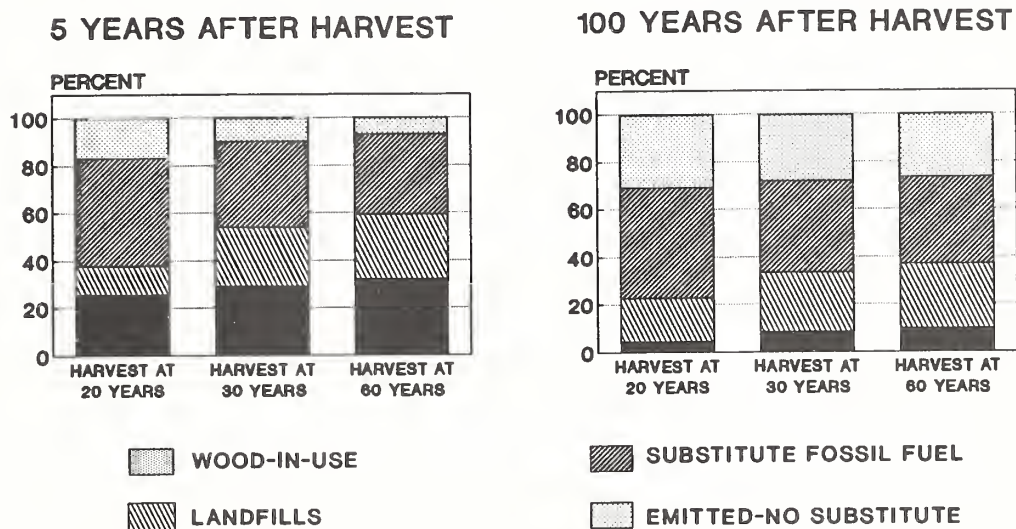
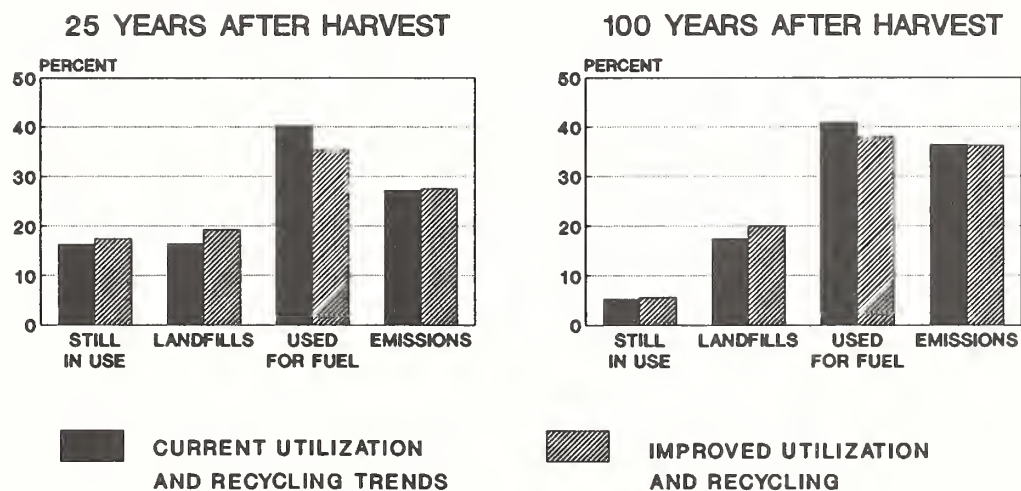


Figure 4

## EFFECTS OF UTILIZATION AND RECYCLING IMPROVEMENTS ON CARBON DISPOSITION





southern pine harvest.

Figure 4 shows comparisons between the estimated disposition of harvested carbon after 25 and 100 years resulting from the two simulations. As can be seen, with the improved utilization and increased recycling the percentages of initial tree carbon sequestered in wood-in-use sinks and landfills are about 13 percent larger after both time periods. The percentage of carbon released by burning for energy is about 11 percent smaller after 25 years and 7 percent after 100 years, largely because with more efficient utilization, less residue is available for energy production. The difference narrows over time as carbon in the wood-in-use sinks are burned for energy. There is little difference in the percent of initial carbon that has been emitted to the atmosphere through burning without energy production or direct emission.

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# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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Washington, D.C. 20250-3900



Outlook '91, Session # C13r

For Release: Wednesday, November 28, 1990

## OILSEED OUTLOOK

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The 1990/91 season will be one characterized with many uncertainties both at home and abroad. Worldwide demand for oilseeds and oilseed products is growing faster than supply, but only slightly. And, the increases in production are mostly in rapeseed and cottonseed while soybean production ebbs.

Throughout most of the 1980's, U.S. soybean acreage declined while that in South America increased. Now, we may be on a threshold of stable or declining production in South America, particularly Brazil. That country's policy of promoting soybean production has proven expensive and changes in policy will affect future crop sizes. Meanwhile, U.S. policy changes could boost production of oilseeds but the effect on soybean production is likely to be slight, at least in the immediate future.

In our traditional European market, demand growth has slowed and domestically produced oilseeds will substitute for greater amounts of imports. But the outlook could change depending on the outcome final outcome of the GATT negotiations and the Oilseeds 301 case. Demand growth is likely to be more rapid in China, the Soviet Union and some Southeast Asian nations in the 90's. But production in these regions is expected to climb as well. Meanwhile, some countries and regions, particularly Eastern Europe, will experience little or no growth in 1990/91 and beyond. In the current year, while there is potential demand in the Soviet Union, uncertainty exists about actual import prospects in light of that nation's financial circumstances. Another major concern is the impact of the December suspension of the Uruguay round of the GATT negotiations.

### Review of 1989/90

Last season witnessed the continued decline of the U.S. share of world oilseed production. Soybeans comprised slightly more than half of total oilseed production in 1970 and is slightly less than that now. What has changed is the U.S. share, which was closer to three-fourths world soybean production in 1970 and is less than half now.

Despite declining U.S. soybean output and slower growth in South American production, world oilseed production rose last year to a record 211 million metric tons. Increases in European, Soviet, and Canadian oilseed production more than made up for the decline in soybean output.

Demand for oilseed products was record high in 1989/90. World protein use topped 118 million metric tons. World vegetable oil use was also a record. However, supplies were generally ample and ending stocks for oilseeds and oilseed products were neither exceptionally tight nor burdensome. In the United States domestic soybean meal use was a record as was domestic use of soybean oil. U.S. total vegetable oil use soared 13 percent in 1989/90 over the previous year.

#### The Outlook for 1990/91

The planting season for the 1990 crop began with an expectation that corn might be in short supply but soybeans would likely be ample. The March Planting Intentions placed soybean acreage at 59.4 million acres, only slightly below 1989 plantings. South American production was estimated at over 31 million metric tons. With U.S. total off-take expected to be only average, stocks would again exceed 300 million bushels.

The first change was a June acreage report that indicated nearly a one million acre decline in 1990 soybean plantings from the earlier March intentions. The 10-25 program was again available as a 0-25 acreage program which permitted farmers to plant more soybeans without adversely affecting their program crop base. Farmers signed up 1.93 million acres for the 0-25 acreage program. Kansas, Nebraska and Illinois had the most acres signed-up. The modest sign-up, well below the 3.5 million signed-up in 1989, suggested farmers still favored corn. The obvious reason was price expectations. In May, November soybeans averaged \$6.40 a bushel and December corn averaged \$2.70 a bushel. Although soybean prices were high, the relative prices still favored cash corn in most regions and certainly corn, at the \$2.84 target, was preferred to soybeans.

The strong price relative favoring corn manifested itself in the June acreage report where farmers indicated soybean plantings of only 57.7 million acres, 2 million below March intentions. The decline in acreage was compounded by delays in planting in the mid-west and later dryness in the South. By August, the first USDA production report placed the 1990 crop at 1,836 million bushels. The November Crop Production report indicated production of 1,904 million bushels. The production estimate is definitely bearish for 1990/91 prices. As of December, we are forecasting prices to average between \$5.25 and \$6.25 a bushel.

Throughout the 1980's total acreage has declined from a 1979 peak of 70-plus million to 1990's under 58 million performance. Regionally, the impact has been felt mostly in the Southeast and Delta states where lower prices combined with regional production difficulties and substantially lower yields than the upper mid-west to discourage production.

This regional acreage shift has several implications for soybean production in the 1990's. Soybean acreage in the Corn Belt has been remarkably stable throughout the 1980's, this is true even of the years before the 1985 farm bill. What I suspect is that rotational practices in the region affect planting decisions perhaps as much as relative prices provided the relatives are not terribly skewed. Additionally, the decline in the relative importance of the southern regions to total production suggests that average or slightly better than average yields in the 6 Corn Belt states will effectively determine U.S. production regardless of events elsewhere. This is essentially what happened this year.

#### The Demand Story

Worldwide demand for oilseed products is expected to grow at a modest pace but at a slightly greater rate than an even more modestly paced increase in supplies. Total consumption of protein meals is forecast to rise 3.2 percent this season compared to a 1-percent annual average for the 3 year 1987-1989 period. Soybean meal consumption is expected to climb an anemic 2 percent in 1990/91 compared to a 1-percent annual average decline for the 1987-89 seasons. The largest increases are expected in China, India, the Philippines, and the Soviet Union. The Soviets have provided the major growth factor to the import market. In the EC, although protein use is expected to be a record, domestically produced sunflower and rapeseed meals will contain growth in imported meal use.

The domestic outlook for oilseed and product demand in 1990/91 is for another strong year while supplies change little. However, year-to-year changes in use or exports will be slight if any. In the United States, domestic soybean meal use is forecast at 22.8 million tons up one percent from 1989/90. This is a possible reason. The feed livestock profitability ratio is near an all-time high. This ratio represents the ratio of an index of prices received for livestock products compared to an index of prices paid for feeds. While prices received by farmers for pork and poultry (the major users of soybean meal) could decline from 1989/90 levels, they will still be high enough compared to the moderate prices expected for feedstuffs to insure profits. Poultry output is expected to climb another 5 percent and pork production should at least hold its own in 1990/91.

In contrast to protein meals, growth in vegetable oil production is expected to exceed growth in consumption. Consumption is expected to rise only 1 percent in 1990/91 while total world vegetable oil production is expected to climb 3 percent. The decline in world soybean production, implies availabilities of this oil will increase only slightly and lag consumption growth in 1990/91. The overall vegetable oil production rise is attributable to gains in palm, rapeseed, and cottonseed oils.

Total world trade in vegetable and marine oils is expected to increase by less than 1 percent in 1990/91. A 3.8-million-metric-ton decline in soybean oil exports contributes to the decline but palm, and sunflowerseed oils also help. Countering this is a sharp increase in rapeseed and cottonseed oil trade. In fact, consumption of these two oils is expected to jump 9 percent each. China



and the Soviet Union are the chief buyers of vegetable oils on the world market. The rise in China comes in spite of a 18-percent rise in oil production in that country. Soviet increases are expected, but they will be below those of the last 2 years.

Stocks climbed to an all-time high in 1987/88 and have receded little since. It is interesting to note that soybean oil plus palm oil stocks have together comprised about half of the total of world stocks. In 1983/84, soybean oil was still the senior partner of the two. However, by 1989/90 and this season as well, palm oil is substantially larger while soybean oil ending stocks in 1990/91 will not differ much from 1983/84. Domestically, palm oil use has fallen and despite its attractive price, there appears to be little interest in its use. Thus, while it appears soybean oil stocks are tightening, worldwide supplies of vegetable oils are quite sufficient. Soybean oil world trade is expected to be at the lowest level since 1985/86. Smaller U.S. and South American supplies will curtail export activity. Rising soybean oil production in importing countries such as China and India also contribute to lowered trade outlook. More generally, consumption of soybean oil will climb only slightly this season; its rapeseed, with a 8.9 percent expected rise and cottonseed oil, at 9.3 percent, that will lead vegetable oil growth.

In the mid-eighties, rising vegetable oil production in both South America and the EC contributed to a fall in U.S. vegetable oil exports. Since the mid-1980's, U.S. vegetable oil exports have become more reliant on government assistance. PL 480 and GSM efforts have increased since the early 80's and finally the EEP and GSM plus EEP programs have helped boost export sales. The effect on prices has been that U.S. soybean oil prices are now at a premium to Rotterdam, whereas in the early 80's, they were at a discount to EC prices.

At home, edible oil use is expected to increase about 1 to 2 percent in 1990/91 after surging 5.5 percent last season. U.S. domestic consumption of soybean oil is expected to total 12 billion pounds this season, little changed from 1989/90. Supplies will be slightly tighter mostly because 1990/91 carryin stocks at 1.3 billion, have continued the descent from their 2-plus billion pound level in 1988/89. Imports are expected to continue at a trickle this season. Domestically, consumption of other vegetable oils is also expected to rise modestly.

#### Outlook for 1991

The new farm program contains several important provisions for oilseed production. Most important and for soybeans is the 15 percent mandatory non-payment acreage (MNPA) on program acreage bases will immediately make some program acreage responsive to relative prices between corn and soybeans or wheat and soybeans. Even in the years before the 1985 bill, the adjustments in corn and soybean acreage year-to-year were small. Other considerations including rotational practices, act to limit changes. Furthermore, the recent upward revision in 1990 production which weakened prices makes soybeans less attractive compared to corn than would have been the case if last summer's prices had prevailed. Uncertainty about ultimate foreign demand, particularly in the Soviet Union and likely drops in South American production could alter

prices and the production outlook by next spring. However at this point, any shift to soybeans from corn on "flex" acres will be quite minimal. Because winter wheat producers are eligible for their entire deficiency payment, movement to soybeans or other oilseeds in winter wheat regions will likely be postponed until 1992. In spring wheat areas, soybeans could be more attractive next spring than wheat and soybeans could also be more attractive than barley and oats at market prices. More soybean acreage in the Dakotas and Minnesota would be the result. At this time, it seems likely that soybean acreage will surpass 1990 plantings, perhaps by 1 to 1.5 million acres.

By 1992, all program provisions will be in place and relative market prices will have more impact on acreage allocations. The present prospects are for wheat prices to continue low. Consequently, soybean, canola and sunflowerseed acreage could be higher. Barring a surge in foreign demand and depending on South American plantings, prices for all oilseeds could be considerably lower by the 1991/92 season.

The new oilseeds program calls for setting an adjusted world price for loan repayment. Objectives in setting the AWP will be to minimize forfeitures and the build-up of CCC stocks. However, budgetary considerations will be a restraint. The new program clearly removes any price floor for foreign producers.

The 1990 farm bill contains provisions that are of benefit to producers of so called minor oilseeds, such as Canola and sunflowerseed. A loan rate of no less than 8.9 cents a pound and the provision allowing oilseed (soybeans excluded) production on 0-92 acreage could encourage sunflowerseed and canola production on some wheat base acreages. Growth of canola as a winter planted substitute for wheat will be a gradual process as farmers become accustomed to growing it and markets develop to handle it. In other words, by 1995 canola acreage could be substantially greater than 1991 or even 1992 plantings. One likely result of the new program would be to limit Argentine sunflowerseed acreage expansion.

#### Other Oilseeds

##### Cottonseed

The 1990/91 outlook for cottonseed features larger supplies, stronger demand and slightly higher prices. A rise in harvested area to 11.5 million acres is pushing up supplies. Meanwhile, strong demand for vegetable oil will prompt domestic use. Direct use for feeding is expected to exceed 2 million tons this season, the first time since 1987/88. For the 1991 crop, ARP is expected to be lower, perhaps as low as 5 percent. Also some MNPA wheat and rice acreage could find its way into cotton or soybean production. Consequently, cottonseed production next fall could be higher.

##### Sunflowerseed

Demand for sunflowerseed is expected to increase this season above last. A forecast higher crush, higher exports and growing use of confectionery seeds will up total use. The generally strong demand for oilseed products is benefiting the sunflowerseed outlook in 1990/91. In 1991, sunflowerseed

production could rise substantially. Planting flexibility could encourage sunflowerseed planting on wheat base acres in Northern regions. If poor wheat prices persist, producers in winter wheat areas could consider grazing or even plowing down winter wheat to take advantage of 0-92 provisions in planting oilseeds.

#### Canola

USDA does not report planting or production of canola seed, at least not yet. Canola plantings will likely benefit from the changes in farm policy that will benefit sunflowerseed. The fact that few farmers have experience with the crop and limits on available markets could inhibit acreage increases in 1991. In future years, canola could become more popular if wheat prices remain low.

#### Peanuts

Drought in the Southeast has prompted sharp price increases for peanuts. Lowered production is expected to boost marketing year prices above quota support prices. A larger-than-normal portion of the crop will be crushed because of quality problems stemming from the drought. However, demand and prices for peanut oil are expected to remain stronger than 1989/90.

#### Corn Oil

This season corn wet-milling is expected to be 2 percent above 1989/90--increased output of both corn oil and corn gluten feed and meal will result. Domestic use and exports of corn oil will increase slightly. Saudi Arabia has been the largest single importer of U.S. corn oil exports. Over 90 percent of corn gluten feed and meal is exported, mostly to the EC.

#### Animal Fats

Consumption of animal fats is expected to continue its decline in 1990/91. Several major fast food chains have changed to vegetable oil, primarily corn and cottonseed oil blends from animal fats accelerating the decline. Edible tallow will bear the brunt of the fall as domestic use is expected to fall to 650 million pounds, the 5th year of declining domestic use. Lard consumption will be slightly higher in 1990/91. As edible tallow domestic use declines, exports surge--Mexico is the largest importer of U.S. edible tallow taking over half of the total.

#### Summary

Soybean production in 1990 recovered to pre-season estimates by November despite dryness in the South and delayed plantings in the mid-West. Later than normal frosts and almost ideal harvest weather promoted excellent soybean yields.

While oilseed production worldwide is climbing, soybean production is not. The largest rises in production have recently come from outside the United States and South America. And its rapeseed and cottonseed that are leading the rise.

Global consumption of protein will lead production slightly while the opposite is true for vegetable oils.

In the United States, soybean crush will exceed last years strong level mostly to satisfy another expected record domestic meal demand, Soybean meal exports could be slightly higher too, but not much.

Soybean oil domestic use will also set another record in 1990/91 but the year-to-year rise will be much smaller than the 1988/89 to 1989/90 climb.

Production in 1991 will be policy affected both here and in South America. Changes in Brazilian Government policy are expected to curtail their acreage. Meanwhile, soybean acreage in the U.S. will be more affected by market prices, which at present will not encourage much increase.

What could change is acreage planted to sunflowers or canola. These could rise because of policy provisions and low wheat prices.



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## OILSEED PROVISIONS IN THE 1990 FARM BILL

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Over the past several years much public discussion has focused on the sharp drop in the U.S. share of world soybean and soybean product trade and the associated drop in U.S. soybean acreage. Arresting and, hopefully, reversing the drop became a policy objective in search of a method. The 1990 Farm Bill and the 1990 Budget Reconciliation Act are a policy response to the soybean dilemma. What is that response? How will it be implemented? And, how will it affect the U.S. oilseed trends of the 1980s? The rest of this paper addresses these questions.

### New Oilseed Programs

The new Farm Bill and the Reconciliation Act mandate several new oilseed provisions:

■ **Nonrecourse loan rates.** The Farm Bill requires the Secretary of Agriculture to make available to producers nonrecourse loans for soybeans of at least \$5.02 per bushel. Sunflowerseed, canola, rapeseed, safflower, flaxseed, and mustard seed loan rates shall not be less than \$0.089 per lb. The Secretary may designate other oilseeds as eligible for marketing loans, and the loan rate must be fair and reasonable in relation to the loan rate for soybeans, except that for cottonseed, which must be no lower than the per-pound rate for soybeans. Loans will be 9 months in maturity. The loan rate must be announced by November 15 of the year prior to the one in which the crop is harvested, except for 1991 when the rate must be announced as soon as practicable after enactment.

■ **Marketing loan repayment rates.** Producers will be permitted to repay oilseed loans at the lesser of the loan rate or the prevailing world market price for the respective oilseed, as determined by a formula prescribed by the Secretary. Alternatively, producers may be allowed to repay

oilseed loans at a level (not to exceed the loan rate) that minimizes forfeitures, government stocks, government storage costs, and allows U.S. oilseeds to be marketed freely and competitively.

■ **Loan deficiency payments.** Producers will be permitted to receive a loan deficiency payment in lieu of taking out a nonrecourse loan. A producer forgoing the loan receives a marketing loan payment equal to the loan rate less the loan repayment rate times the crop eligible for the loan.

■ **Cottonseed.** If it is determined that any oilseed program or programs causes or is likely to cause a reduction in the price of cottonseed or cottonseed oil, then the Secretary must act to stabilize or raise the price of cottonseed without decreasing the price of other oilseeds.

■ **Loan origination fees.** The Reconciliation Act requires that producers taking out an oilseed loan must pay a 2 percent origination fee. The fee is 2 percent times the loan rate times the quantity placed under loan. Producers receiving loan deficiency payments must also pay the fee.

■ **Minor oilseed provision.** The Farm Bill requires that producers receiving payments under the 0-92 program be allowed to produce oilseeds (excluding soybeans) on any or all of the underplanted acreage that would otherwise be devoted to conservation uses. In order to receive 0-92 payments, the producer would have to forgo eligibility for marketing loans for any of the minor oilseeds planted on 0-92 acres as well as such acres planted elsewhere on the farm.

There are also several key discretionary provisions in the 1990 legislation related to oilseeds:

■ **Planting flexibility.** The Farm Bill authorizes producers to plant for harvest oilseeds (and other specified crops) on up to 25 percent of a crop's acreage base and protect the crop base (known as 15 percent "normal flex acres" and 10 percent "optional flex acres"). The Secretary does have discretion to prevent any crop including oilseeds from being planted on the flex acres. The Reconciliation Act prevents producers from receiving deficiency payments on 15 percent normal flex acres, in addition to the percentage of crop base idled under acreage reduction programs. This means producers may plant oilseeds and other permitted crops on the normal flex acres primarily on the basis of expected market returns, since no deficiency payments are involved in the choice. Because producers would still be eligible for loans on the flex acres, relative loan rates may influence

plantings, particularly for the minor oilseeds. Planting of alternative crops on the additional 10 percent of base, the optional flex acres, would cause the producer to lose payments, although base would continue to be protected. So this offers little additional flexibility. Planting of soybeans on the 10 percent optional flex must be prohibited if the upcoming crop year soybean price, projected on January 1, is less than 105 percent of the loan rate, or \$5.27 a bushel.

■ **Planting on reduced acres.** Producers may be allowed to plant up to one half of the acres idled under acreage reduction programs (reduced acres) in oilseeds, including soybeans. For each acre so planted, the producer would forgo deficiency payments on a number of acres determined by the Secretary so as to ensure that this provision results in no additional cost to the government.

### Key Implementation Issues

There are several major issues among the required provisions that must be resolved in order to implement the oilseed program. USDA is in the process of analyzing the program choices and hopes to have all decisions made for the 1991 programs by mid-December. At this point, we cannot provide any guidance on the possible outcome of this process other than to identify some of the principal areas of analysis.

Basic decisions include identifying the oilseeds, if any, eligible for loans beyond those oilseeds specified in the law. Another decision is the oilseeds to be allowed to be planted on flex acres. Another decision is which additional oilseeds should be permitted on 0-92 acres. Decision criteria include trying to provide farmers with as much flexibility as possible while minimizing program costs and distortions to the market.

A critical issue is the "prevailing world market price" or "such other level" to be used as the marketing loan repayment rate for soybeans. There are numerous candidates. A rigorous, visible formula such as that for cotton may be used or a less visible one, such as that for rice. One formula is to use prices of soybean products in foreign markets, adjust to a U.S. basis, and subtract off a normal crush margin. Another would be to use soybean prices in foreign markets and adjust to a U.S. basis. Another would be to use the soybean price at U.S. export ports. Another would be to use local farm level prices (the Posted County Price concept). There are numerous other issues--how many prices to include, should prices be weighted, what transportation costs should be used and how often should they be adjusted, and so on. The decision criteria include selecting data that are attainable and reliable and that will result in loan repayments



without undue Government marketing loan payment costs. Loan repayment rates for the minor oilseeds have the same options as well as the option of being tied to the soybean repayment rate or soybean and soybean product prices.

There are also some procedures that must be established in the event program changes are necessary. For example, there must be a procedure to assess whether cottonseed and cottonseed oil prices are being affected by the oilseed programs, and if so, what to do about it.

### General Implications

The above list of provisions is not exhaustive in that there are other provisions that will directly affect oilseeds, such as payment limits. However, we may concentrate on the above list to draw some observations on how the programs may work.

Soybean loan program. The soybean producer interests did not obtain the level of loan protection initially requested, but the level achieved is, nevertheless, a dramatic increase in protection. Early in the Farm Bill debate, a soybean loan rate was proposed that was tied to the corn and cotton target price level--the so-called Graduated Equity Loan (GEL). The GEL formula resulted in a loan rate in the area of \$6.25 a bushel, with provision for reducing the eligible volume of soybeans when stocks were low. The House-passed bill provided an expected loan level in the range of \$5.25 to \$5.51 a bushel over 1991-95. The Senate bill rate was expected to be \$5.50 during the life of the bill. So, the \$4.92 (after adjusting for the loan origination fee) rate that emerged from conference is substantially lower.

The conferees were driven to the \$5.02 rate in order to return soybean program costs to the budget baseline, and the reduction to \$4.92 via the origination fee was forced in order to provide a soybean contribution to deficit reduction. Even so, \$4.92 is a 9.3-percent increase from the current \$4.50 loan level. Such increases in support for any commodity have not occurred since the late 1970s. Moreover, the loan is a marketing loan which means that producers may be able to repay at a lower rate than at which they sell the crop. This is how the cotton and rice programs have worked and, if this occurs, the protection afforded by the loan would exceed \$4.92 by the difference between the market price and the loan repayment rate.

A second point relates to the argument that a higher soybean loan rate was desirable both in terms of supporting incomes and increasing production to restore exports. Obviously, the loan rate could have little effect on either objective unless the rate is, somewhat frequently, set at or above likely loan repayment rates, or prices that would otherwise prevail. Two forces worked



against setting a high loan rate to achieve acreage and income objectives--program cost and planting flexibility.

The USDA's Mid-session review baseline placed the FY1991-95 soybean program costs at below \$100 million. For comparison, USDA estimated that a \$5.00 marketing loan would cost close to that level--at \$100 million--under the scoring convention which assumed trend yields, no flexibility, and a 5-cent per bushel spread between the loan rate and the loan repayment rate. However, using the more realistic approach of considering yield probabilities, the projected cost rose to \$1 billion. If flexibility is added and larger repayment spreads are considered the cost soars into the billions.

Will the effective \$4.92 loan rate raise outlays and move acreage into soybeans? Assuming the loan repayment rate is close to the domestic market price, the answer is that costs are likely to be modest and virtually no additional acreage will be attracted to soybeans due to the loan rate provision. For example, even if flexibility were to cause a shift of 2 million additional soybean acres, we estimate that the probability of the marketing loan having an annual cost of more than \$250 million is less than 10 percent. To the extent that the loan is not affecting returns, it will not cause much of an expansion in soybean acres.

Minor oilseed loan programs. The law has created a number of entirely new programs for crops that are somewhat unknown at the national level and then put these programs in a straight-jacket by specifying the loan rate at a universal 8.9 cents a pound. The Farm Bill debate spent a great deal of time examining the relationship between the soybean loan rate and the projected soybean prices and almost no time on the relationship between 8.9 cents and the prices of minor oilseeds. The plea to set the minor oilseed loan rate based on discretion or through rulemaking was not heard. Furthermore, the law asks that the loan be repaid at the lesser of the 8.9 cent loan rate or the applicable world price or such other level that reduces CCC storage costs.

From the viewpoint that it is desirable to have market signals allocate acreage, should the minor oilseed loan program be cause for alarm? Perhaps, if 8.9 cents less 2 percent, or 8.72 cents, is out of line with market prices on a regular basis. Table 1 suggests an answer.

Table 1. Average annual oilseed prices.

	<u>Soybeans</u>	<u>Sunflowerseed</u>	<u>Flaxseed</u>	<u>Cottonseed</u>
	-----Cents/lb.-----			
1980	12.6	10.9	12.9	6.5*
1981	10.1	10.8	11.9	4.3*
1982	9.5	9.0	9.2	3.9*
1983	13.1	13.0	12.2	8.3*
1984	9.7	11.3	10.9	5.0*
1985	8.4	7.9*	9.0	3.3*
1986	8.0*	6.9*	6.2*	4.0*
1987	9.8	8.3*	6.1*	4.1*
1988	12.4	12.1	13.7	6.0*
1989	9.3	11.1	12.9	5.5*

\*=years when domestic price averaged below the loan rate.

Had the 1990 Farm Bill provisions been in effect during the 1980s, there clearly would have been episodes of loan rates influencing production. And, the table understates the incidence for the following reasons: 1) prices would have been below loan for short periods even if the annual average was above, 2) oilseeds received indirect price support because of the inflexibility of farm programs, and planting flexibility would likely have meant more oilseed production on average, and 3) marketing loan repayment rates have generally been below market prices, triggering marketing loan gains even when prices averaged above loan. It seems pretty clear that the marketing loan will influence minor oilseed production during the life of the 1990 Act.

Cottonseed is a special case. The price data indicate that the 1990 Act requirement that the cottonseed loan rate, if implemented, be no less than the per-pound soybean rate is out of touch with market price history. This program would be a windfall to cotton producers and very costly for the taxpayer.

A final point is that the effect of the loan programs and flexibility on national oilseed production is going to be negligible for all oilseeds except soybeans and sunflowers. That follows from the small acreages involved. Table 2 shows acreages from the Census of Agriculture for 1987.

Table 2. Harvested acreage of oilseeds, 1987

Soybeans	55,291,205
Sunflower	1,982,357
Flaxseed	429,690
Safflower	210,629
Rapeseed (inc. Canola)	41,778
Mustard seed	<u>16,691</u>
Total	57,972,350

If the acreage of the minor oilseeds, excluding sunflowers, doubles from this level, U.S. oilseed acreage rises 1.2 percent, with very modest implications for oilseed supplies and prices. If they double and sunflowers does also, U.S. oilseed acreage rises 4.6 percent, with more substantial market effect, particularly in the oil market because the minor oilseeds have a greater oil content than soybeans. For a national assessment of effect, soybeans and sunflowers are most significant.

Planting Flexibility. The USDA through its Green Book pointed to flexibility as the single-most effective way to address the decline in soybean acreage and related competitiveness issues. USDA scored the Farm Bill and Reconciliation Act flexibility provisions as a savings of nearly \$7 billion over FY1991-95. This savings was premised on a shift from feed grains to soybeans based on their relative net returns from the market. In the analysis, the average annual increase in soybean acres due to flexibility over the life of the farm bill was estimated to be 1.5-2 million acres.

The more immediate issue is what is in store for 1991. The first step in responding is to examine the incentives to plant alternative crops. Analysts have developed net return analyses ad infinitum, and that is a good first step. As an example, the following table shows returns using recent cash prices in 3 regions: spring wheat areas, the Delta, and the central Corn Belt.

Table 3. Net market returns (above variable cash expenses) using cash prices of early November 1990

	<u>Northern Plains</u>	<u>Delta</u>	<u>Corn Belt</u>
	-----Dol./ac.-----		
Wheat	30	25	55
Sunflowers	55	--	--
Barley	30	--	--
Oats	15	--	--
Corn	--	--	140
Soybeans	--	75	155
Cotton	--	202	--

These returns, if they were to reflect 1991 price expectations through planting time, would suggest more oilseeds--more soybeans in the Corn Belt on both corn and wheat base, more cottonseed in the Delta, and more sunflowers in the Northern Plains. The soybean returns would suggest a modest increase in soybean acres, particularly knowing that there are many producers who would be happy to avoid the input cost, take advantage of the rotation, and not have it cost them money. However, the sunflower returns, which are "deep in the money" together with



the tens of millions of 0-92 acres and normal flex acres has led to some projections of a large increase in minor oilseed acres.

A point is that sample net returns are only a beginning in acreage forecasting. Acreage must be forecast in conjunction with price forecasts. Acreage is shifted from one crop to another until forecast prices change to the point that net returns from the market are equalized across crops. Obviously farmers believing sunflower acreage will double in 1991 will be using a lower net return for sunflowers. Even this iterative approach has limitations, depending on such things as the relationship between a farm's demonstrated ability to produce oilseeds and its ownership of crop acreage bases.

The \$15 per acre difference in net returns between corn and soybeans in the table would about disappear with a net shift of 1 million acres from corn to soybeans. One million more soybean acres has a price multiplier of about \$0.15-0.20 a bushel, while 1 million fewer corn acres has a multiplier of about \$0.05-0.10 a bushel.

There has been much speculation over the size of the shift involving minor oilseeds due to the normal flex, optional flex, and 0-92 plantings, and the loan rates. A large percentage increase in sunflower area seems likely, even assuming winter wheat growers generally stick with winter wheat. The potential for more sunflower (and flax too) acreage reflects the past higher acreage. Where have all the flowers gone? In 1982, the Northern Plains states harvested 4.6 million acres of sunflowerseed; this year's acreage is down to 1.8 million (table 4). Over that time, the CRP gained the most acreage followed by barley and soybeans.

Table 4. Regional planted acreages, 1982 and 1990

	<u>North Plains</u>		<u>Corn Belt</u>		<u>Delta</u>	
	<u>1982</u>	<u>1990</u>	<u>1982</u>	<u>1990</u>	<u>1982</u>	<u>1990</u>
	-----Mil. ac.-----					
Wheat	19.2	18.8	6.2	6.4	3.4	2.3
Corn	11.9	12.0	39.2	37.9	0.2	0.5
Sorghum	0.5	0.5	1.1	0.7	0.6	0.5
Barley	3.6	4.5	0	0	0	0
Oats	5.3	3.4	2.3	2.4	--	--
Soybeans	6.2	7.0	31.8	29.5	11.2	7.2
Flaxseed	0.8	0.2	0	0	0	0
Sunflowers	4.6	1.8	0	0	0	0
Cotton	0	0	0.2	0.2	2.1	3.2
Rice	0	0	--	--	2.5	2.5
CRP	0	7.1	0	4.7	0	1.1
Total	52.1	48.2	80.1	81.8	20.0	17.3



Table notes:    ▶--means negligible; program crop acres include ARP acres idled; 1990 figures are June estimates;  
▶wheat is harvested acres;  
▶North Plains: MN, ND, SD; Corn Belt: IL, IN, IA, MO, OH; Delta: AR, LA, MS.

### Conclusion

The 1990 legislation opens new doors for the U.S. oilseed industry. While the loan program will provide increased income support, it is flexibility that will make the most difference. The 15 percent normal flex provides the incentive to plant more soybeans and minor oilseeds. The optional 10 percent offers little flexibility and will have a negligible effect on oilseed acreage. The minor oilseeds on 0-92 acres will be attractive in some wheat areas. However, shifts on the normal flex acres, the higher 1991 wheat ARP, the \$3.70-3.75 per bushel prices of the previous 2 years, and the unlikelihood of another world wheat crop as large as in 1990 will affect expectations about 1991 wheat and may restrain plantings of minor oilseeds on 0-92 acres.

The new oilseed programs may or may not reverse the chronic slide in U.S. oilseed production. What the programs will do is make it easier for U.S. farmers to expand production if market prices call for it.

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## **OUTLOOK FOR OILSEEDS - FARMER PERSPECTIVE**

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The outlook for oilseed farmers in the next year and through the 1990's will be one of adjustment - adjustment to some of the most sweeping changes ever made to governmental farm programs, adjustment to the continuing forces of international market economies, adjustments to a host of environmental and food safety concerns and adjustments to rapidly changing technology. Down on the farm, these internal and external forces will mean dealing with increased price fluctuations and greater market risks. This will result in farmers having to make increasingly difficult decisions on planting decisions, longer-term crop rotations and the planting of new crops. Decisions will be made not only for the income returns but also to deal with a number of environmental and conservation concerns. Risk management in financing, insurance and marketing will become critical.

The 1990 farm bill, largely driven by budget concerns, has substantially reduced federal program outlays, increased planting flexibility and added new layers of complexity for farmers. This is especially true for soybean producers whose production practices and options vary considerably by regions. The impact on farmers by the 1990 farm bill and the oilseed provisions will vary greatly between regions and individual farming operations. Additionally, significant discretionary authority by USDA will add uncertainty to many program options and details.

As of today, any judgement on the 1990 farm bill would be premature. Many farmers believe that agriculture's share of the budget reduction effort was disproportionately unfair. While the cuts made are significant, the approach of reducing the number of payment acres versus a target price cut was viewed by most farmers as a better policy in terms of allowing producers to grow alternative crops and maintaining farm income. This approach will become a major educational step for farmers adjusting to the continuing trend toward greater market orientation. With target price protection removed on 15% of their program crop acreage, farmers will have to be even more cognizant of marketing opportunities and strategies.

It is noteworthy that the basic commodity program structure has been retained in the 1990 farm bill. Over the last 60 years of farm programs, fairly major modifications to farm bills have occurred on the average of one every nine months. This will likely continue and the retention of these program structures will maintain an infrastructure that will allow for needed changes.

Lastly, we all need to understand that the budget reconciliation agreement which helped shape a five year farm bill in 1990 may be good at best for one year. Next year will bring a continuation of budget pressures attempting to deal with the budget deficit. The agricultural budget will not be exempt from further budget cuts. Further agricultural budget cut proposals will likely include discussions on payment limitations, additional target price cuts (or further expanding triple base acreage) and expanding loan origination fees for other program crops.

### KEY OILSEED PROVISIONS

Perhaps the most dramatic changes in any commodity program in the 1990 farm bill occurred in Title VII - The Oilseeds Title. The major provisions of this title combined with changes in the planting flexibility and program eligibility requirements will have a major impact on the production and marketing of oilseeds in this country. Due to the development and enactment of many "firsts" for this program, including a world price formula for an extremely complex and diverse international oil and protein market, there will likely be many fine-tuning adjustments from year to year.

The oilseed title has several major provisions for oilseeds summarized below:

1. LOANS: The marketing loan rate for soybeans shall not be less than \$5.02 per bushel and the minimum loan rate for sunflower, canola, rapeseed, safflower, mustard seed and flaxseed shall not be less than 8.9 cents per pound. A two percent loan origination fee will apply to all oilseed loan participants. Other oilseeds may be designated by the Secretary as eligible for marketing loans. A farmer who produces eligible oilseeds can take out a nonrecourse CCC loan and repay the loan at the lower of the loan level or the prevailing world market price as determined by a world price formula. The marketing loan repayment provisions shall apply with no specific minimum repayment rate, but authority is given to the Secretary to set a repayment rate that will minimize loans forfeitures and government cost. Theoretically, this should encourage U.S. soybeans to be marketed competitively in both domestic and international markets.

2. LOAN DEFICIENCY PAYMENTS: Loan deficiency payments will be made available to producers who agree to forego obtaining a loan. Such producers would receive the same marketing loan payment made to CCC loan participants. The two percent loan origination fee would also apply to deficiency payment recipients.

3. MARKETING YEAR AND ANNOUNCEMENT DATES: The soybean marketing year shall be September 1 through August 31, and the marketing year for other oilseeds shall be established by the Secretary. Announcement of the loan level shall be made by November 15 in the calendar year preceding the harvest of the crop. For the 1991 crop year, the announcement will be made as soon as practicable.

4. MINOR OILSEED PLANTINGS: Farmers participating in the 0-92 program will be allowed to plant minor oilseeds (defined basically as all oilseeds except soybeans) on the underplanted acreage. Such plantings would make the producer ineligible for the marketing loan on any minor oilseed planted on that farm.

Other important features in the 1990 farm bill that will impact oilseeds production include the guidelines for planting on the 25 percent "flexibility acres". This includes 15 percent of each crop acreage base where no deficiency payments are received (mandatory non-paid acreage, MNA) and the additional ten percent of base acres for which deficiency payments could be made (optional non-paid acreage, ONA). Experience over the last few years with the 0-25 program for soybeans indicate there will be little shift on the ten percent of base where deficiency payments could continue to be received. Oilseeds grown on any of these flexibility acres would be eligible for loan. There is an additional restriction for soybeans on the 10 percent optional non-paid acreage if USDA estimates the national average price of soybeans during the following marketing year would be less than 105 percent of the loan rate or \$5.27 per bushel.

Another planting flexibility option affecting oilseeds is the Flexi-ARP provision (optional reduced deficiency payments). This provision allows for planting one-half of the acreage reduction program set-aside acres in oilseeds if a producer is willing to forego deficiency payments at a rate that results in no additional program costs to the government.



Another cost reduction amendment to the farm bill from the Budget Reconciliation Act was to use 12-month versus 5-month average prices in calculating deficiency payments. Graphs 1 and 2 show the yearly variation and deficiency payment change this would have meant for corn and wheat over the last ten years. Obviously, any reduction in deficiency payments will decrease the attractiveness of program participation and increase the market responsiveness of planting decisions.

A combination of other changes in the 1990 farm bill will have a major impact on the planting of oilseeds (and other crops) in the coming years. These include changes in payment limitations, cross compliance, the Agricultural Resources Conservation Program (ARC) [which includes the existing Conservation Reserve Program (CRP) and a new Water Quality Incentives Program] and the continued implementation of the conservation compliance plans from the 1985 farm bill.

Payment limitations have been lowered from a maximum of \$500,000 to \$250,000 for all program benefits spread across the three-entity rule. Under the new legislation, a producer can receive a total of \$100,000 in deficiency payments - \$50,000 in deficiency payments on the primary farming operation and \$25,000 each on two others. Marketing loan gains are now limited to \$150,000 total payment - \$75,000 on one primary operation and \$37,500 on each of two others. Further reduction in payment limits will continue to reduce the attractiveness of program participation for some of the largest producers. This would open the door for a possible increase in oilseed plantings if the net returns compared to other program crops on non-paid acreage are favorable.

The new farm bill prohibits cross compliance or offsetting compliance as a program benefit qualification. This means that farmers can exceed their base on one program crop without affecting their enrollment or benefits in another crop program. This provision, along with the planting flexibility provisions, will allow producers to make both short and longer-term cropping pattern shifts. Producers can continue to certify zero acreage planted to a program crop and receive considered planted credit provided that fruits, vegetables, dried edible beans or any other restricted crops aren't grown on their base acreage.

The conservation programs will continue to impact the acreage and location of crop plantings. The farm bill requires enrollment in the CRP by 1995 of not less than 40 million or more than 45 million acres of environmentally sensitive land, shelterbreaks, windbreaks and marginal pasture land on which trees have been planted. This expanded CRP eligibility criteria would include a substantial amount of land that was brought into soybean acreage in the 1970's and much of which has gone back into its native state. Enrollment of such land in CRP would restrict soybean acreage expansion on these lands. It is too early to accurately estimate soybean acreage that could be impacted by the Wetlands Reserve and Water Quality Program. It is noteworthy, however, that conservation compliance plans written under the 1985 farm bill which included oilseeds in their rotation plans will likely need to be revisited during the implementation of those plans by 1995. This could restrict soybean production (which has relatively low residue) and encourage alternative conservation tillage production methods.

In addition to all these farm program details, farmers must take into account other agronomic and economic dynamics associated with oilseed production. Consider the minor oilseed plantings provision on 0-92 land. The actual usage of the provision will depend upon many factors including the estimated returns to a producer, the agronomic feasibility of growing alternative crops, production know-how and in some cases, availability of markets and processing facilities.

### POSSIBLE PRODUCTION SHIFTS

To measure the possible shift to minor oilseeds and its impact on the oilseed sector, total acreage and comparative crop budgets were examined. Approximately 56 of the 58 million harvested acres of oilseeds are soybeans. Thus, a relatively large increase in acreage of the minor oilseeds combined with their often greater oil content would only increase U.S. oilseed production marginally. Sunflowers are the second largest oilseed crop behind soybeans. An analysis of comparative crop budgets for sunflowers versus other crop alternatives indicate only modest increases in oilseed production on many 0-92 acres. For example, in Minnesota, in 1990, 186,000 acres of corn were idled. The crop budgets indicate returns from non-program corn and soybeans are substantially higher than planting sunflowers. The 0-92 option payment of corn is estimated at \$50 per paid acre. However, this payment will only be paid on 77.5% of the base acreage (100% less 15% triple base and a 7.5% ARP) or an average of \$39 per acre. The sunflower returns are estimated at \$69 per acre. This means that a farmer who opts for sunflower planting would net about \$108 per acre (\$69 + \$39). This return is much more favorable than the 0-92 option but less favorable than returns from corn or soybeans. Comparing returns from planting sunflowers on the 31,000 idled acres of 0-92 wheat in Minnesota indicates that soybeans are a preferable option but can

not be grown in some wheat areas. Comparative returns for the 526,000 acres of 0-92 wheat in Kansas in 1990 shows sunflower returns at \$60 per acre compared to \$65 per acre with wheat on triple base and \$75 per acre with soybeans on triple base. These returns are based on one set of budget assumptions: when yield, price or production costs vary, these returns are changed substantially. These various budget outcomes do indicate that the response to increased planting flexibility will vary greatly by region and by farm. The key with budget analysis is to develop a realistic set of numbers for an individual farm. An additional option for Kansas farmers could be to graze out their wheat acres and plant sunflowers on 0-92 acres. The 0-92 payment combined with a forward contract for sunflowers could greatly reduce the farmer's risk. Returns for North Dakota farmers indicate a potential shift to sunflowers on 0-92 wheat acreage. This would be an attractive alternative if the wheat base is in a sunflower growing area. There is a ready market in many locations in North Dakota near processing plants and a timely decision could be made before their spring wheat crop is planted. Obviously all of these relationships would change with shifts in production and price outlook for relevant crops.

During the debate for a marketing loan for soybeans, two primary arguments were given for such a program: 1) income protection against low prices and 2) prevent a U.S. price floor for foreign soybean competition. Given the budget constraints and the resulting \$5.02 loan level, it is unlikely that the soybean loan will offer much income support or provide incentive to increase soybean plantings. The marketing loan provision should prevent any kind of U.S. price floor. In either case, any real impact of the soybean loan provisions will occur during historically low prices. During such a time, the marketing loan and loan deficiency options would also increase the marketing options for soybean producers. (See Table 1)

The real impact for soybean producers resulting from the 1990 farm bill will come from the oilseed provisions combined with the planting flexibility options. Tables 2 and 3 show sample farm budgets indicating where soybean acreage may prove a viable option if competing with non-payment acreage. In almost every case analyzed, soybean returns do not compete for extended time periods against full program crop benefits.



## LONGER TERM CHANGES

In 1991, producers will likely be conservative with any changes. This will be especially true given the lack of knowledge about many details in this legislation. Given the many flexibility options available, farmers will undoubtedly learn to maximize their returns utilizing the various options - - including staying out of the program altogether. Different choices will be made for the full-payment permitted acreage, the 15% triple-base acreage, the 10% flexible acreage and the Flexi-ARP options. Generally, the full-payment permitted acreage will remain in the original program crop production. The 10% flexible acreage will likely see little cropping pattern shifts on an aggregate basis. The 15% triple base acreage will see the major shift in cropping patterns primarily based on the comparative price outlook and longer-term cropping pattern shifts.

With these flexibility options, the planting responsiveness to relevant commodity prices will increase. Table 4 gives variable production costs and yields for a typical midwest corn/soybean farm. Graphs 3, 4 and 5 indicate the soybean/corn price ratios that are relevant for 15% triple-base acreage, the 10% optional flex acreage and the breakeven to stay out of the program entirely.

These graphs only include variable costs and show the breakeven price for soybeans calculated for various corn price levels. For example, in Graph 3 on triple base acreage, a corn price of \$2.25 per bushel equates to a soybean price of \$5.62 per bushel and the soybean/corn ratio of 2.5. Graph 6 combines all three analyses. Note that all options become parallel after the corn price reaches the \$2.75 frozen target price level.

[Current cash prices in central Illinois at the time of this writing are \$2.22 for corn and \$5.67 for soybeans, almost right at the breakeven for triple base land (\$2.25/\$5.62). However, future prices (Nov. 20) are \$2.49 for December 1991 corn and \$6.04 for November 1991 soybeans. Without any adjustment for the basis, it appears that the soybean future price would have to increase over 50 cents per bushel or corn would have to decline about 15 cents per bushel before farmers have an incentive to switch corn triple base land to soybeans.]

There are two major implications for farmers from these graphs: 1) any substantial change in any major variable such as price or yields will quickly change the expected returns and 2) producers must look beyond price ratios or other conventional rules-of-thumb to determine their most appropriate crop mix. Clearly, increased flexibility will require a lot more planting and marketing analysis for individual producers.

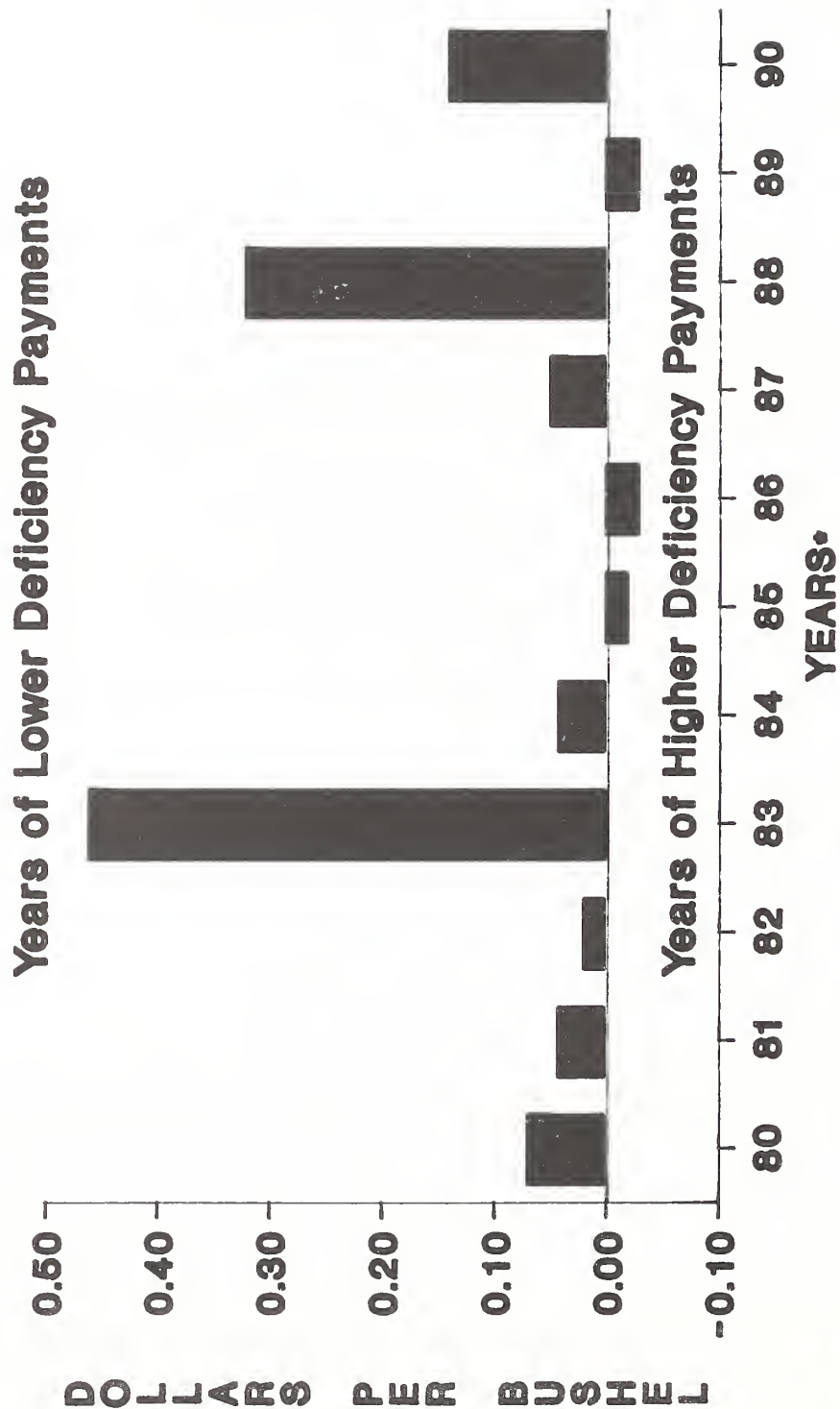


The economic environment for U.S. agriculture will become even more interdependent with global developments. Fiscal and monetary policies are critically important to a farm economy that is both sensitive to interest rates and export dependent. Historically, public policy for agriculture has usually followed events rather than preceded changes in economic circumstances. The 1990 farm bill has moved in a far more frugal direction that gives farmers more flexibility while retaining layers of complexity. Producers are hopeful that this new farm bill and the accompanying economic conditions will allow U.S. agriculture to adjust to the tremendous changes facing this sector.

# GRAPH 1

## CORN

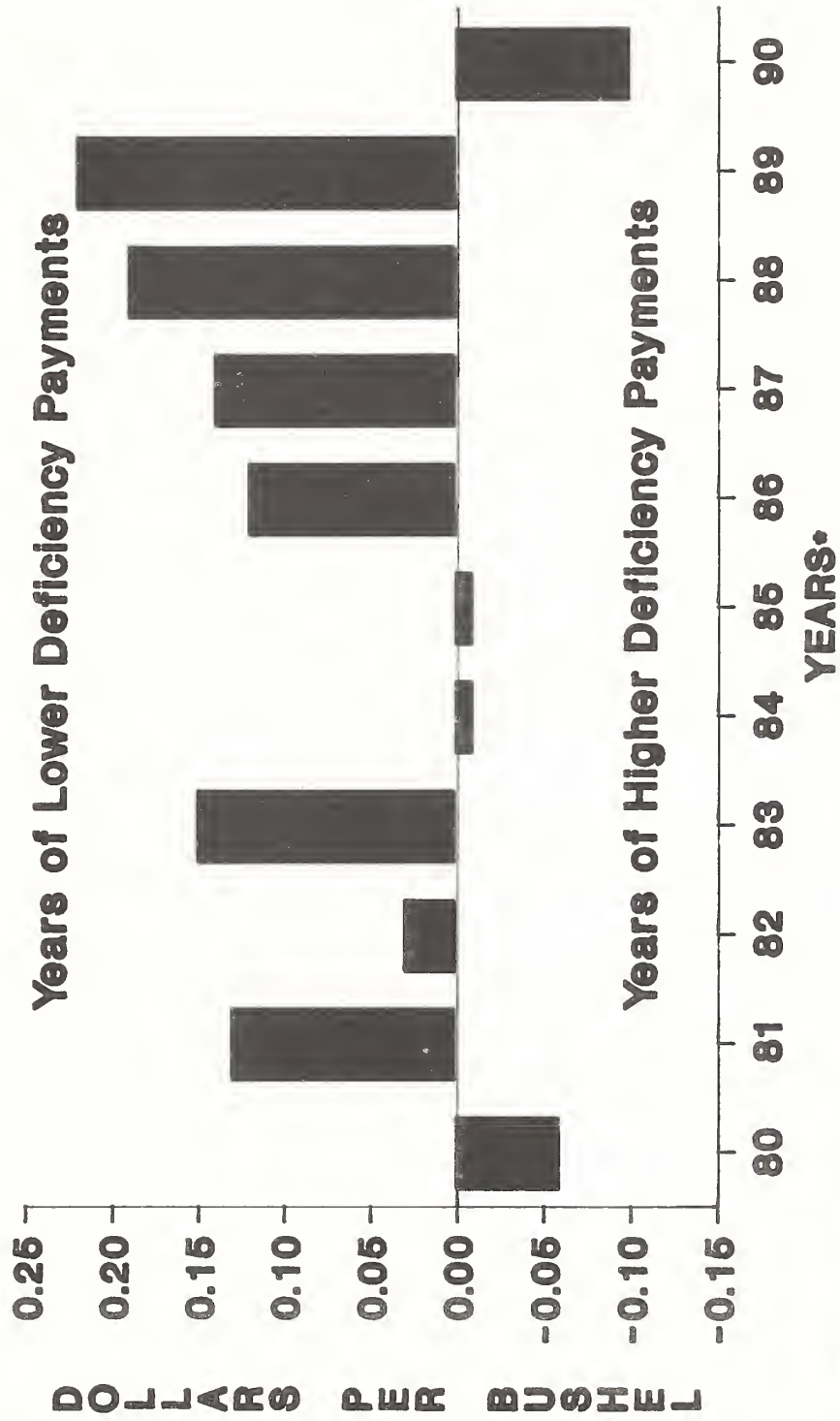
### Difference between 12 Month and 5 Month Average Prices



•Sept-Aug Crop Year Ending, ie 1979/80-80

**GRAPH 2**

**WHEAT**  
**Difference Between 12 Month and 5 Month**  
**Average Prices**



•June-May Crop Year Ending, 1979/80-80

**TABLE 1****SOYBEAN RETURNS WITH \$5.02 MARKETING LOAN****(Low Price Scenario)**

<b>For example only -</b>	Price of soybeans on October 1, 1991	\$4.55/bu
	Price of soybeans on June 30, 1992	\$5.36/bu

<b>Marketing Options</b>	<b>Total Return on June 30, 1992 (\$/bu)</b>	
Selling beans off the combine		
Cash price - October 1	\$4.55	
Interest saved/earned - 8%	0.27	\$4.82
Storing beans in self-owned bin		
Opportunity Costs (interest @ 8%)	(0.27)	
Cash price - June 30	\$5.36	\$5.09
Loan deficiency payment, selling beans		
Loan deficiency payment	\$0.37	
Cash price - October 1	4.55	
Interest saved/earned - 8%	0.27	\$5.19
Beans under loan through June		
Loan proceeds - October 1	\$4.92	
Interest saved/earned - 8%	0.29	
Repay CCC loan	(5.02)	
Interest paid to CCC @ 8%	(0.30)	
Cash price - June 30	5.36	\$5.25
Loan deficiency payment, holding beans		
Loan deficiency payment	\$0.37	
Opportunity costs (interest @ 8%)	(0.27)	
Cash price - June 30	5.36	\$5.46

SOURCE: American Soybean Association



**TABLE 2****SAMPLE FARM BUDGET WITH TRIPLE BASE****(Midwest Scenario)****100 ACRE CORN BASE**

	<u>Net returns above variable costs</u>	
	Total	Per Acre
Current Program with 7.5% ARP	\$20,874	\$208.74
15% triple base with non-program corn on triple base acres, 7.5% ARP	\$19,974	\$199.74
15% triple base with soybeans on triple base acres, 7.5% ARP	\$20,181	\$201.81

<u>Assumptions:</u>	<u>Non-program Corn (per acre)</u>	<u>Soybeans (per acre)</u>	<u>Program Corn (per acre)</u>
Actual yield (bu)	135	40	135
Program yield (bu)	120	-	120
Variable cost of production	\$138.08	\$60.57	\$138.08
Target price			\$2.75
Loan rate	\$1.62*	\$4.92**	\$1.62
Cash price	\$2.25	\$6.00	\$2.25

<u>Calculation:</u>			
Gross receipts	\$303.75	\$240.00	\$303.75
+			
Government payments	0	0	\$60.00
=			
Gross returns	\$303.75	\$240.00	\$363.75
-			
Variable cost of production	\$138.08	\$60.57	\$138.08
=			
Net returns	\$165.67	\$179.43	\$225.67

\* Non-program crop on triple base acreage is eligible for loan only.

\*\* Soybean loan rate is \$5.02 less 2% loan origination fee.

SOURCE: American Soybean Association

**TABLE 3**  
**SAMPLE FARM BUDGET WITH TRIPLE BASE**  
**(Southeast/Delta Scenario)**  
**100 ACRE COTTON BASE**

	<u>Net returns above variable costs</u>	
	Total	Per Acre
Current Program with 10% ARP	\$14,259	\$142.59
15% triple base with non-program corn on triple base acres, 10% ARP	\$13,548	\$135.48
15% triple base with soybeans on triple base acres, 10% ARP	\$13,300	\$133.00

<u>Assumptions:</u>	<u>Non-program Cotton (per acre)</u>	<u>Soybeans (per acre)</u>	<u>Program Cotton (per acre)</u>
Actual yield (bu)	650	25	650
Program yield (bu)	600	-	600
Variable cost of production	\$311.47	\$55.48	\$311.47
Target price			\$0.729
Loan rate	\$0.508*	\$4.92**	\$0.508
Cash price	\$0.650	\$6.00	\$0.650

<u>Calculation:</u>			
Gross receipts	\$422.50	\$150.00	\$422.50
+			
Government payments	0	0	\$47.40
=			
Gross returns	\$422.50	\$150.00	\$469.90
-			
Variable cost of production	\$311.47	\$55.48	\$311.47
=			
Net returns	\$111.03	\$94.52	\$158.43

\* Non-program crop on triple base acreage is eligible for loan only.

\*\* Soybean loan rate is \$5.02 less 2% loan origination fee.

SOURCE: American Soybean Association

**TABLE 4**

**PRODUCER RETURNS**

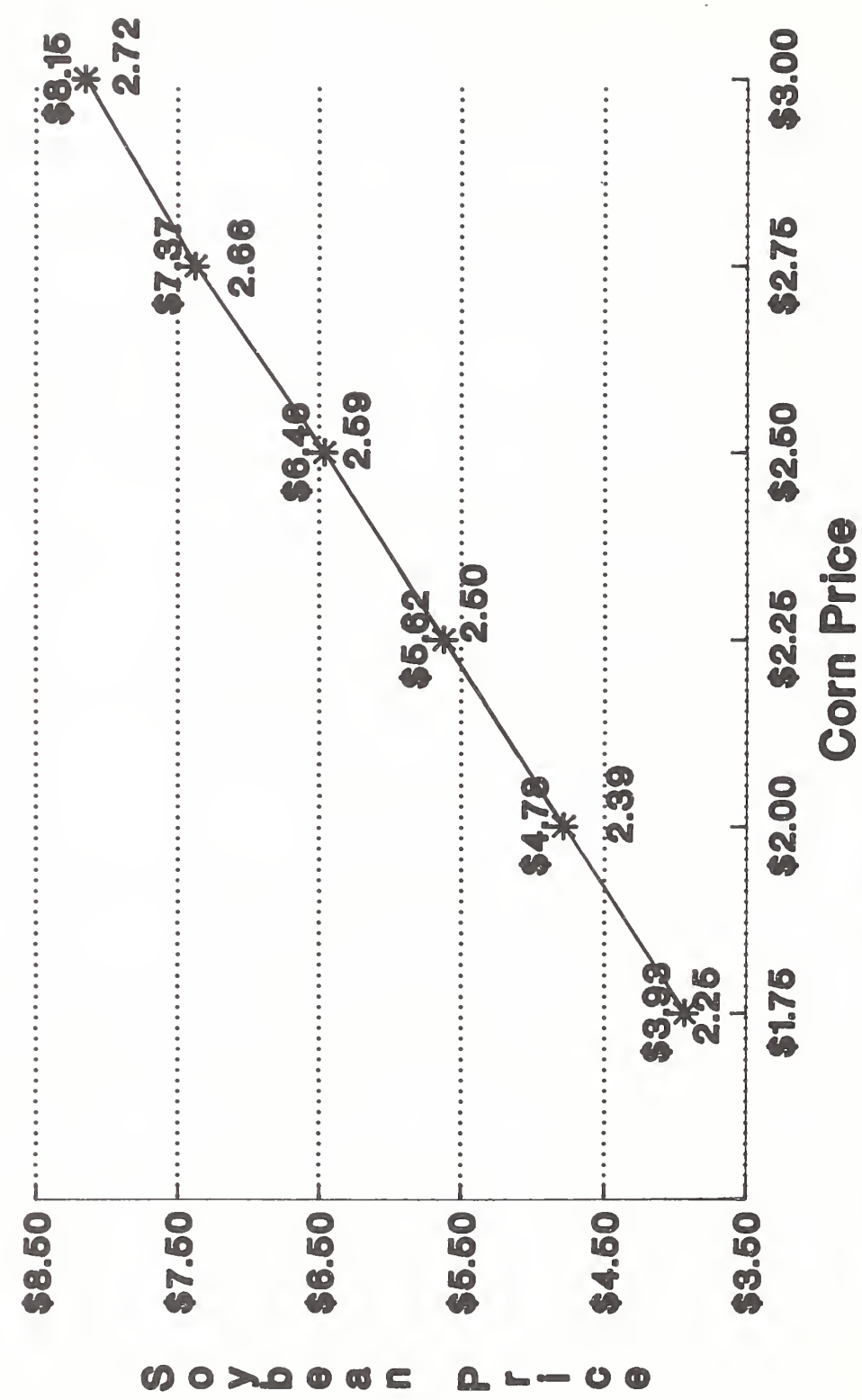
**ALTERNATE SCENARIOS FOR 1991 CROPS\***

Corn Base (acres)	200
Actual Yield (bu.)	135
Program Yield (bu.)	117
Corn Cost/Acre	\$149
Feed Grain ARP	10%
ARP Cost/Acre	\$11.50
Corn Target Price	\$2.75
Corn Loan Rate	\$1.63
Soybean Yield (bu.)	40
Soybean Loan Rate	\$4.92
Soybean Cost/Acre	\$70
Triple Base (Non-pay) Acres	15%
Voluntary Flexible Acres	10%

\*SOURCE: SCI 10/26/90  
AFBF Economic Research Division: Nov 90

GRAPH 3

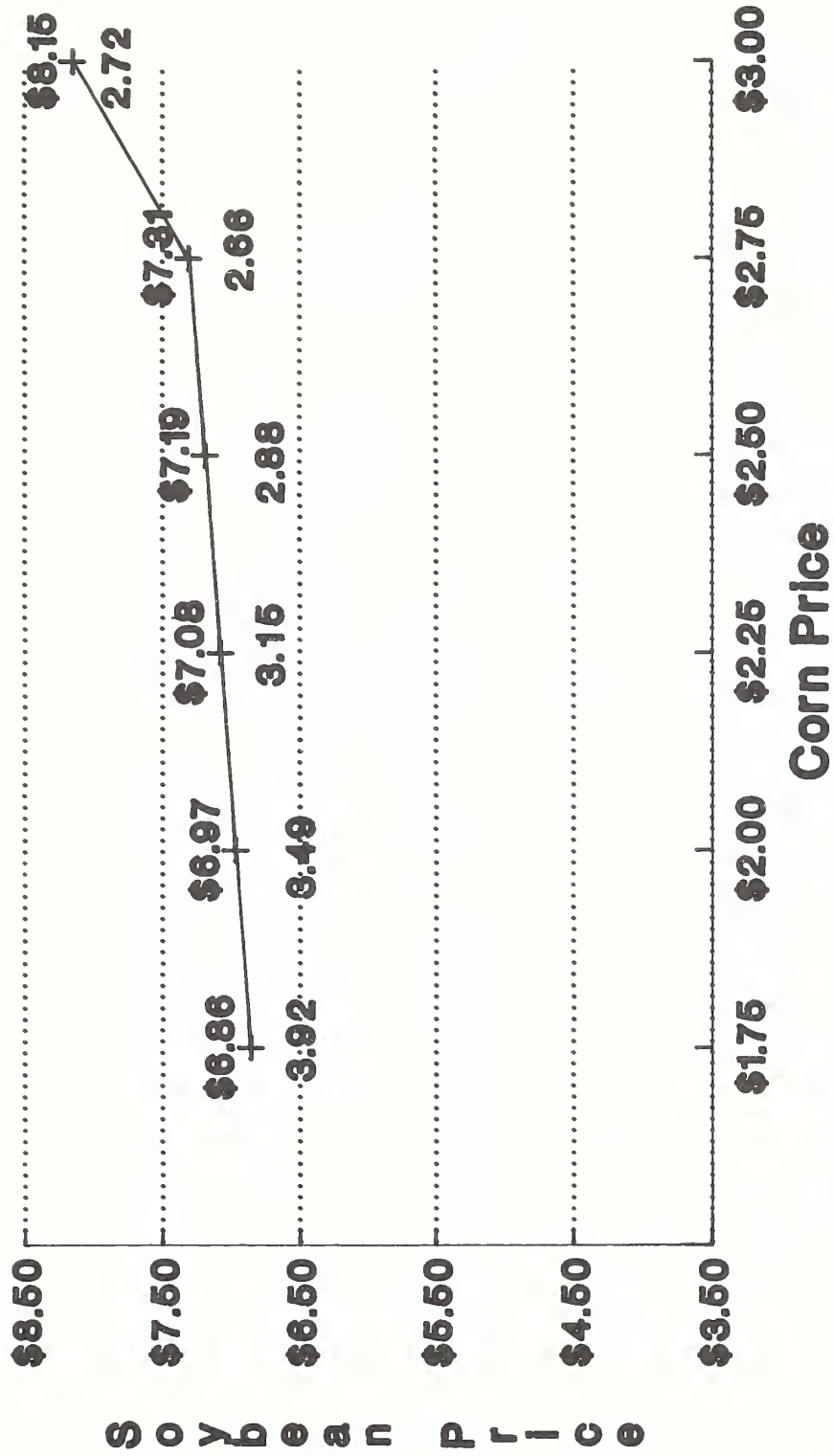
# Soybean - Corn Incremental Breakeven Land Affected by Triple Base



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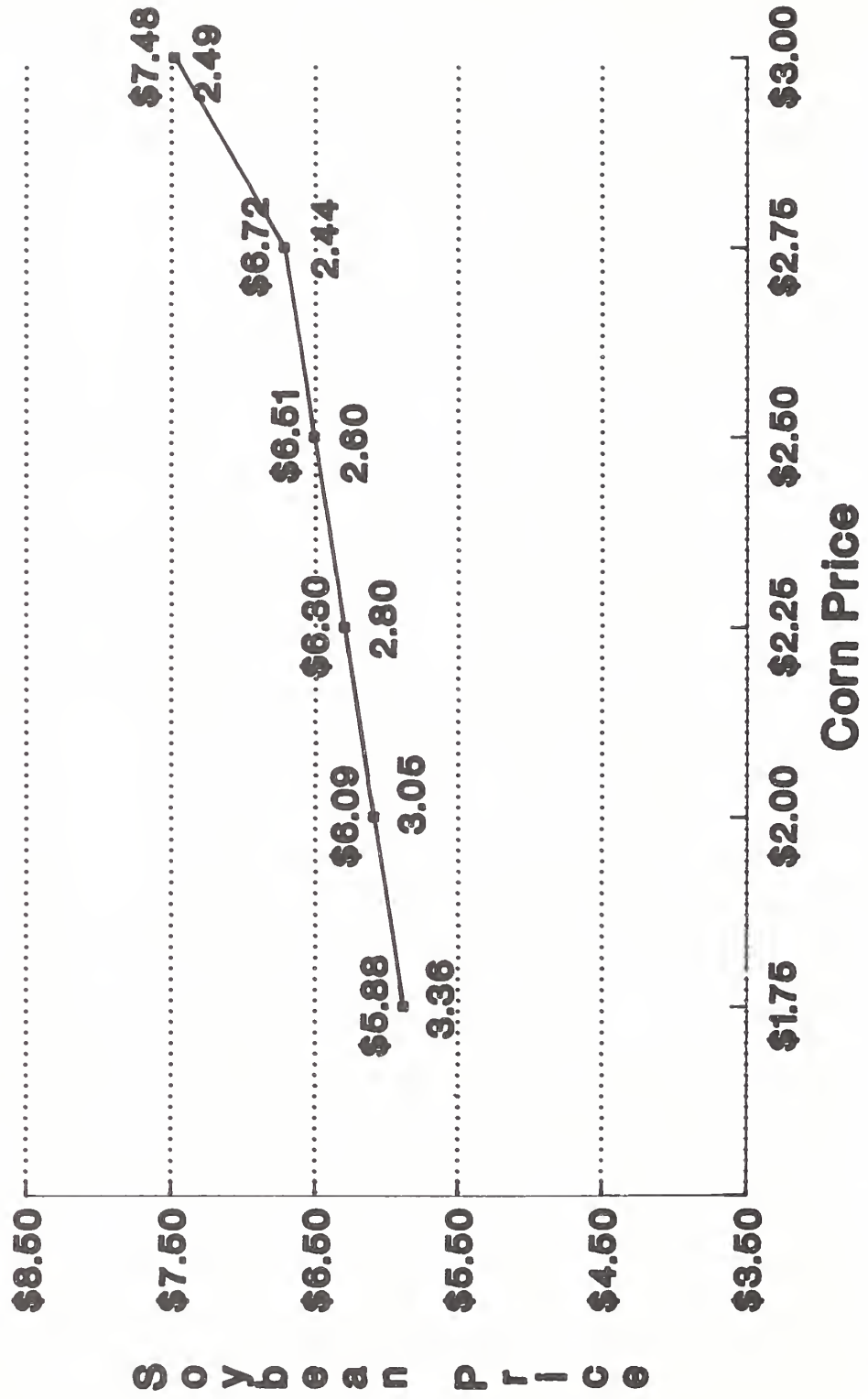
# Soybean - Corn Incremental Breakeven Lose Deficiency Payment 10% Optional Flex



AFBF Economic Research Division: Nov 90

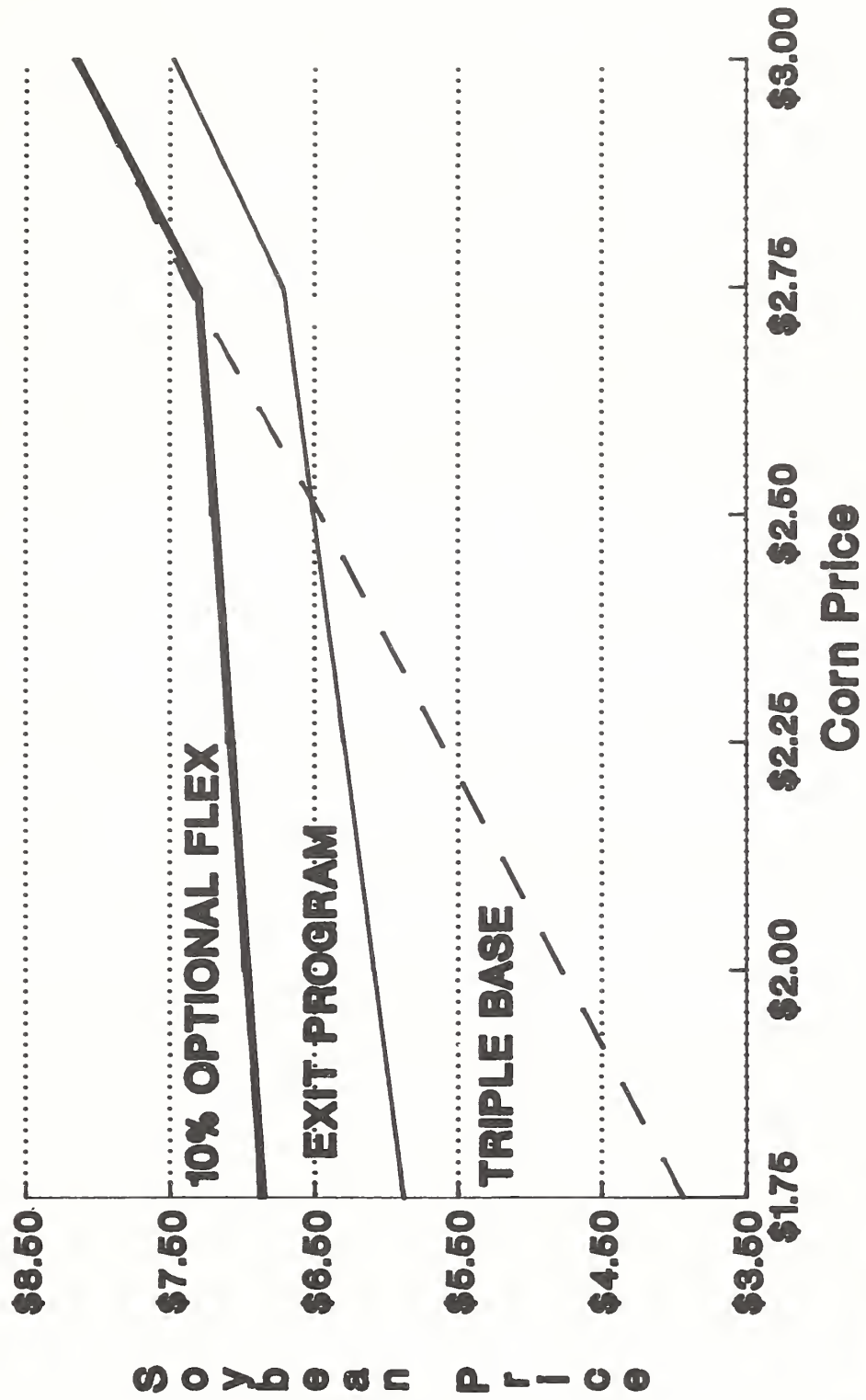
GRAPH 5

# Soybean - Corn Incremental Breakeven Exit Program Entirely



GRAPH 6

# Soybean - Corn Incremental Breakeven 1991 Planting Season



AFBF Economic Research Division: Nov 90

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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Outlook '91, Session # C14

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## THE 1991 OUTLOOK FOR FOOD PRICES

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Retail food prices in 1990 have been climbing at a 6 percent pace, the same as last year. This 6 percent rate is sharply higher than the 2 to 4 percent increases in food prices that characterized most of the 80's. Also, in 1990 the Consumer Price Index (CPI) for food has been rising at a faster pace than the CPI for all items. These developments have generated considerable concern among both industry analysts and consumers regarding food price trends and their relationship to inflation in the general economy.

My remarks today will focus on the major causes of rising food prices, how these factors have affected food prices in 1990, and how they are expected to influence food costs in 1991. First, I will briefly review the use of the Consumer Price Index (CPI) as a tool for measuring overall retail price changes and how food prices relate to that index. Next, I will discuss the major factors determining food prices. Finally, I will discuss the 1991 forecast and review developments in the major food CPI categories in 1990 and the outlook for those categories in 1991.

### What is the CPI?

The Consumer Price Index for all urban consumers is the most widely used and closely watched indicator of retail price movements in the economy. It is compiled monthly by the Bureau of Labor Statistics (BLS), U.S. Department of Labor. It is based on nationwide surveys of retail prices for a fixed basket representing all consumer goods and services.

The CPI is a tool for measuring change in retail prices and is expressed as a percentage of some base period. In our case, we are measuring changes in consumer prices for a fixed bundle of foods from a base period of 1982 through 1984. The index for the base period is set equal to 100. Indexes in other time periods are expressed as a percentage of the base 100. For example, the CPI for food in October was 133.6, indicating prices for the same fixed basket of foods averaged 33.6 percent above the base period. With this series of monthly index numbers, analysts can assess price movements between time periods by comparing the respective indexes.



### Factors Affecting Retail Food Prices

Farm prices, costs of processing and distributing food, and consumer demand are the three major factors affecting food prices. All of these factors have played a role in pushing food prices higher this year. Farm prices were pushed up in 1990 because of tight supplies of some farm commodities. Costs beyond the farm gate for processing and distributing food increased about 7 percent, reflecting increased use of inputs and higher input prices. Consumer demand for food remained relatively strong through the first half of 1990, but decreasing real disposable income in the second half will likely dampen demand.

### The Food Price Outlook

In 1991, food price increases are likely to be more moderate than in 1990, rising at a rate between 2 and 5 percent. There are uncertainties surrounding this forecast, mainly concerning the general economy and the crises in the Persian Gulf. While the total economic picture for 1991 seems cloudy, larger supplies of some major food commodities will work to keep retail prices lower.

There is agreement among analysts that the economy will slow in 1991, but to what extent is not clear. Settlement of the confrontation with Iraq could take sometime. Where crude oil prices will settle, if at all, is also in question. These uncertainties cloud the 1991 outlook for the general economy. Unemployment in 1991 will rise and real disposable personal income is expected to decline. Inflation is likely to persist, mainly because of higher oil prices resulting from the Persian Gulf crises.

In any case, a slowdown of the economy will have a dampening effect on retail prices. Declines in personal income weaken consumer demand and reduces inflationary pressure on prices. Higher oil prices will have a limited effect on the costs of processing and distributing foods. Major energy inputs in food processing and distribution are electricity and natural gas which are only slightly effected by higher oil prices. Motor fuels, however, are strongly effected by higher oil prices and transportation costs are likely to rise.

### Food commodity outlook

#### Red meats

Retail red meat prices have been record high in 1990. Retail pork prices in 1990 will average nearly 14 percent above 1989. Beef prices will average about 7 percent above 1989. Both beef and pork production declined this year, the second consecutive year of decline for beef. Domestic supplies of beef will average 2 percent below

last year and pork will average 4 percent below a year ago. In 1991, beef supplies are expected to remain about level with 1990 but pork supplies are expected to expand slightly. As a result, prices for red meats in 1991 will not rise nearly as much as in 1990.

#### Poultry

Poultry prices in 1990 will average about the same as they did in 1989. Poultry production continued to grow this year and larger supplies kept prices from rising. At the same time, smaller supplies and higher prices for red meat kept poultry prices from falling. Poultry production is expected to continue to grow in 1991. Larger supplies of poultry and red meats will likely cause poultry prices to decline next year. Currently, poultry prices are expected to drop next year by as much as 5 percent.

#### Eggs

Retail egg prices have been volatile through most of 1990. While month-to-month price changes have been sharp, the yearly average price will be about the same as the 1989 average. Egg producers have been cautious about expanding production. Production increased about 1 percent in 1990 and a similar modest increase in 1991 is expected. Retail prices for eggs in 1991 are expected to average 5 to 10 percent below 1990.

#### Dairy products

Strong demand for processed dairy products, particularly cheese, has pushed the CPI for dairy up about 9 percent this year from 1989. At the beginning of 1990, stocks of processed products were tight, milk production had just returned to normal following the 1988 drought, and dairy prices were record high. Most of 1990 has been a time of rebuilding stocks of processed products in a climate of strong demand, particularly for cheese. Cheese prices have remained high and demand pressure from processors has kept fluid milk prices high also. In 1991, the CPI for dairy products will likely decline slightly reflecting a sharp drop in producer prices for milk as milk production continues to grow.

#### Fruits

Fruit prices rose sharply in 1990. Most of the increase can be attributed to the freeze in Florida and Texas last Christmas. The citrus crop was severely damaged and prices for oranges, grapefruit, and orange juice rose sharply. The CPI for fresh fruit will average more than 12 percent above 1989 and the processed fruit index will be up about 9 percent. Ideal growing conditions in Florida this year have produced a bumper citrus crop and prices for citrus are expected to decline. In contrast, a smaller apple crop will likely cause higher apple prices in 1991 and offset lower citrus prices. Overall, the CPI for fresh fruit next year is expected to remain about level

with 1990. Also, the CPI for processed fruit, which is strongly influenced by orange juice prices, is not expected to show much change from the 1990 levels.

#### Vegetables

Fresh vegetable prices rose sharply in last winter following the late December 1989 freeze in Florida. Prices recovered with the harvest of spring crops. Potato prices have been particularly high during 1990, reflecting strong demand for processed potatoes. Export demand for frozen french fries has been particularly strong this year, causing pressure on domestic supplies. The fall potato crop was 5 percent larger than a year ago, helping to ease supply pressure. Potato prices have dropped considerably this fall, however, as of October, prices were still higher than October 1989.

#### Cereals and bakery products

The CPI for cereals and bakery products rose about 6 percent this year, a slower rate of increase than last year. The rise in cereal and bakery product prices in recent years has been primarily from stronger consumer demand for high fiber cereals. Consumers continue to be health conscious and demand continues to create some upward pressure on prices. However, the rise in prices for cereals and bakery products in 1991 is expected to be more moderate than this year, reflecting lower wheat prices and slower market growth.

# Changes in Food Price Indicators, 1988 through 1991

	1988	1989	Forecast	
			1990	1991
Consumer Price Indexes			Percent	
All Food	4.1	5.8	6.0	2 to 5
Food away from home	4.1	4.6	5.0	4 to 6
Food at home	4.2	6.5	6.5	1 to 4
Meat, poultry, and fish	3.5	5.0	6.5	0 to 3
Meats	2.4	4.0	9.0	1 to 4
Beef and veal	5.5	6.4	7.0	1 to 4
Pork	-3.0	0.6	14.0	-1 to 2
Other meats	2.6	2.8	9.0	1 to 4
Poultry	7.2	9.9	-1.5	-5 to 0
Fish and seafood	5.8	4.5	2.0	2 to 4
Eggs	2.3	26.6	1.0	-10 to -5
Dairy products	2.4	6.6	9.0	-2 to 2
Fats and oils	4.6	7.2	4.0	4 to 6
Fruits and vegetables	7.6	8.5	7.5	1 to 4
Fresh fruits	8.3	6.6	12.4	0 to 3
Fresh vegetables	6.3	10.7	4.0	-1 to 3
Processed fruits & vegetable	7.9	6.3	6.5	3 to 6
Processed fruits	10.3	3.2	9.0	1 to 3
Processed vegetables	4.8	10.7	3.0	3 to 6
Sugar and sweets	2.7	4.7	4.5	4 to 6
Cereals and bakery products	6.4	8.4	6.0	4 to 6
Nonalcoholic beverages	0.0	3.5	2.0	3 to 6
Other prepared foods	3.7	6.4	4.5	4 to 6

Source of historical data: Bureau of Labor Statistics; forecasts by Economic Research Service.



## Summary

Larger supplies of farm foods will have a strong influence on food prices in 1991. The farm value of food, that portion of the consumer dollar which goes to farmers, is expected to average nearly 6 percent below 1990. If the decline in farm value is totally passed through to consumers, the dampening effect on the food CPI would be nearly 2 percent. Costs of processing and distributing food and consumer demand will be influenced by a slowdown in the general economy. The CPI for food in 1991 is expected to average 2 to 5 percent above 1990.



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**FOOD MARKETING AND NEW PRODUCT DEVELOPMENT  
IN RESPONSE TO HEALTH CONCERNS**

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In today's information age, the food industry increasingly feels the effects of a particular type of new information: that linking diets with health. We know that the American populace is longer-lived, healthier, and spending a smaller proportion of its income on food than at any time in history. Some are tempted to ask, "What more does the American consumer want?" Well, it may be precisely those conditions--the affluence, the long lives, and the wish to maintain health--that encourage American consumers to search for food products they think will help them live even longer and healthier.

At the same time, food manufacturers are competing like never before for a special place in the consumer's heart and pocketbook via his or her head and stomach. In this paper I am going to do three things. First I will survey major dietary recommendations and health concerns related to diet. Second, I will sketch briefly some trends in food consumption and market sales. Third, I will show you some of the food industry's responses to the plethora of health information and health concerns. I will end with a mere mention of some of the important policy issues that have been raised by all the attention to health in the food marketplace. Labeling, health claims, product formulation, and nutrition education issues promise to color the market landscape of the future for consumers and producers alike.

**DIETARY GUIDELINES AND RECOMMENDATIONS**

Where does public information related to health and diet originate? Over time, numerous scientific experiments--both animal and human--as well as epidemiological analyses are undertaken. The results cumulate over many years and are reviewed and interpreted periodically to identify significant relationships between nutrients, diets, and health conditions. Research is conducted worldwide and is interpreted, most significantly in the United

States, by the government and by the National Research Council and its associated agencies. In addition, public health organizations such as the American Heart Association and the American Cancer Society make dietary recommendations.

Although the U.S. government has issued dietary guidance periodically for nearly 100 years, the emphasis of the guidance has changed, particularly in the last 20 or so years. From a nation that was prominently concerned about dietary deficiencies and infectious diseases, we have evolved. Now our principle concerns are excess or imbalanced consumption and chronic diseases.

Table 1 shows some of the most influential government reports since George McGovern's controversial Senate Select Committee on Nutrition and Human Needs published its "Dietary Goals for the U.S." in 1977. In 1979, the Public Health Service of the Department of Health and Human Services published Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention. Diet and nutrition was one priority area. In 1980, the United States Department of Agriculture, in conjunction with the DHHS, published the first edition of the Dietary Guidelines for Americans.

In 1988 and 1989, two extremely important reports were issued: the first by the Surgeon General of the Department of Health and Human Services, called The Surgeon General's Report on Nutrition and Health and the second, Diet and Health: Implications for Reducing Chronic Disease Risk, by the Committee on Diet and Health of the National Research Council.

These reports are significant because they indicate that substantial agreement now exists on many of the basic known relationships between diet and health. This is true even though the science is constantly evolving and, therefore, the details always changing.

In November 1990, the most recent set of Dietary Guidelines was published and announced by USDA and DHHS. Using newly affirmative phrasing, the Guidelines urge Americans to:

- o Eat a variety of foods
- o Maintain healthy weight
- o Choose a diet low in fat, saturated fat, and cholesterol
- o Choose a diet with plenty of vegetables, fruits, and grain products
- o Use sugars only in moderation
- o Use salt and sodium only in moderation
- o If you drink alcoholic beverages, do so in moderation.

What are the major health messages and dietary recommendations flowing from the reports and guidelines I have mentioned? Table 2 summarizes the guidelines that are shaping public knowledge of good nutritional practices. These guidelines concern body weight and



energy requirements; the proportion of calories from fat; and specifically, saturated fatty acids; and dietary cholesterol. The first row of this table shows recommendations for weight, ranging from the avoidance of overweight, to the maintenance of a healthy weight. (The most recent USDA/DHHS dietary recommendations have recognized that higher-than-previously-recommended weights may be consistent with good health as people age.)

Americans currently obtain approximately 36 percent of their calories from fat, with 13 percent derived from consumption of saturated fats. A consensus of major reports that provide quantitative targets is that the proportion of calories from fat should be reduced to, or below, 30 percent, with under 10 percent of calories from saturated fats. The reports recommend substitution of lower fat for higher fat foods.

Finally, recommendations also agree that dietary cholesterol should be reduced from current levels of 300-450 mg/day to under 300 mg/day.

Additional recommendations address consumption of complex carbohydrates, salt and calcium. At least five servings of a combination of vegetables and fruits, especially green and yellow vegetables and citrus fruits should be consumed daily. Intake of starches and other complex carbohydrates should be increased by eating six or more daily servings of a combination of breads, cereals, and legumes. The National Research Council recommends that the intake of carbohydrates be increased to more than 55 percent of total calories. Complex carbohydrates are found in starches, vegetables, legumes, breads, cereals, and certain fruits. Total daily intake of salt (sodium chloride) should be limited to 6 g. or less. Salt-induced hypertension is a concern for many. Finally, an adequate calcium intake should be maintained.

Achieving consensus on dietary goals and recommendations is never easy. Yet in the broad outlines, much consensus has been achieved. What is driving the consensus? Evolving knowledge about some of the relationships between diet and health, to which we now turn.

#### DISEASE, HEALTH, AND DIET

A variety of chronic diseases and health conditions has been linked to diet in one way or another. Table 3 lists some of the major chronic conditions of concern ranging from anemia to osteoporosis. It is inevitable as we learn more about the subtle interplay of diet, heredity, environment, and health that this list will change. Some of the conditions on the list, however, are critically significant because they are among the top ten causes of death in the U.S. today.

The ten leading causes of death and the estimated total deaths and percent of total deaths attributable are shown in table 4. Those



diseases in bold have been linked to diet. It is important to remember that statistical association does not by itself indicate causation, nor is diet the only factor influencing health status.

The major cause of death in the U.S. today is linked to diet. Heart disease kills over one in three Americans and upwards of 759,000 people annually. Cancers are next in frequency, killing over one in five Americans, and over 476,700 people each year. Thirty-five percent of all cancers are estimated to be associated with dietary patterns. The third leading cause of death is strokes, which also are linked to diet. Diabetes mellitus and atherosclerosis also have dietary associations. Finally, if alcohol and tobacco--agriculturally based products--are included in the conception of diet, each of the top ten diseases may be linked in some way to dietary patterns.

Because cancer receives so much attention, table 5 presents positive and negative correlates of some types of cancer as identified by the NRC. In general, alcohol, tobacco, and high fat intake line up on the "bad" side, while fresh fruits and vegetables and several vitamins and minerals are negative correlates of some types of cancers.

#### SELECTED CONSUMER ATTITUDES AND SHOPPING PRACTICES

Consumer response to dietary guidelines and information can be measured by polls, such as that conducted for the Food Marketing Institute: Trends--Consumer Attitudes and the Supermarket. Shoppers were asked to rank the importance of various factors in food selection. In 1990, nutrition scored second behind taste as the most important factor in food selection. Food safety followed in the number three position. Ninety-six percent of consumers said nutrition was somewhat or very important as a factor in food selection.

Table 6 details the steps consumers are taking to ensure a healthy diet. Over half of consumers say they are eating more fruits and vegetables, about a third claim they are eating less meat, and 27 percent say they are eating less fats and oils. About one in five consumers also indicate they are eating more chicken and fish than before and cutting down on sugar. About 15 percent indicate they are eating more fiber, less salt, and less cholesterol than previously.

#### TRENDS IN FOOD CONSUMPTION

Many consumers are claiming that they are consuming a more healthy diet. Their attitudes can be matched with their actual behavior by studying consumption patterns. Table 7 shows twenty years of food consumption trends. America's food choices have been changing, and U.S. agriculture has had to respond.

Per capita consumption of food has been trending upward, but since 1985, crop product consumption has increased at a greater rate than animal product consumption. Since 1983, consumption of poultry and fish has eclipsed consumption of red meat. Per capita consumption of eggs has fallen while dairy product consumption remained relatively constant. Within the dairy category, however, changes have occurred in the types of products consumed. Over the 1967-1988 period, fluid whole milk consumption declined 55 percent, lowfat milk consumption increased 291 percent, and nonfat milk consumption increased 54 percent. Consumption of yogurt increased 820 percent. However, consumption of high fat cheeses and "other frozen products" also increased. Since 1967, consumption of sugar and sweeteners, flour and cereal products, and fats and oils has trended upward. Again, however, the changes within categories are the real story. For example, between 1967 and 1988, the consumption of animal fats declined by 32 percent, while that of vegetable fats increased 55 percent. As fast food companies such as McDonalds and Burger King replace their animal-based cooking oils with vegetable oils, this trend may continue. However, health concerns are not the only factor driving the American diet: taste, food safety, food quality, variety, convenience, product information, and price also influence food consumption.

#### MARKETING HEALTHY FOOD PRODUCTS

Health has become both the offensive and the defensive strategy of the food industry as the 1990s kick off. We know that population growth is flat and people's stomachs are relatively fixed in capacity (if not flat). For that reason, fierce competition for the consumer's food dollar abounds. Competitive success flows to manufacturers or sellers who can persuade a consumer to substitute their own for a competitor's product. Successful persuasion, in turn, hinges on the food manufacturer's ability to position products to respond to consumer concerns.

Industry sources estimate that about 9,192 new food products were introduced in 1989, a 12 percent increase over 1988 (Prepared Foods New Products Annual 1990). Many of these were in fact "healthy" product extensions of established brands.

Many of the 9,192 new products bore one or more health-related descriptors or claims. As seen in table 8, between 1988 and 1989, the number of new products bearing claims of reduced calories, low calories, or lite increased over 100 percent. Even more striking was the 128 percent increase in new products claiming reduced or low fat. The number of new products claiming low or no cholesterol increased over 200 percent, as did those claiming reduced or low sugar. Finally, the number of products making a claim of high or added calcium jumped dramatically, but from a small base. To summarize, the health-related product trends of the 1980s responded (at least in label) to many of the health concerns noted above. They touted "reduced fat," especially saturated fat or tropical



oils, "reduced cholesterol," "reduced calories," "reduced sodium," "high fiber," or "calcium added."

How do grocery product sales compare with all the health concerns we've examined above? An industry source proclaims that: "All a product needs these days is a number of health-enhancing characteristics and a preparation process limited to the microwave oven"(Progressive Grocer, July 1990). Table 9 shows that the top ten gainers among those products selling over \$100 million include natural snacks, pretzels, bottled water, baby formula, and corn/tortilla chips. Each of these products had sales growth of over 15 percent in 1989-90.

Table 10 shows those products with the largest sales gain in the over \$100 million category and those in the under \$100 million category. Among products with sales over \$100 million, meat products gained almost \$3 billion while produce gained \$1.8 billion. Deli products followed with an increase in sales of almost \$0.8 billion. Bakery foods, prepared frozen foods, carbonated soft drinks, and ready-to-eat cereals all gained more than \$0.5 billion in sales. To prove that not all is health driven, cigarettes gained in sales, as did cookies. Ironically, cookie gains were due at least in part to health claims of "no tropical oils."

If we examine product sales categories under \$100 million, we see substantial gains in categories that can be promoted as healthy: canned mixed vegetables, baby cereals, potatoes, beans, carrots, and peas.

New product introductions are one measure of dynamism in the marketplace. Because meat products are so important in overall consumer food expenditures and in supermarket sales, table 11 details new product introductions for the past three years. The greatest number of new product introductions last year were in the categories of poultry; bacon, ham, sausage; and seafood. By comparison, new beef, pork, veal, and lamb products were introduced at less than half the rates.

#### Reduced Calorie Products

One of the dietary recommendations is to maintain a healthy weight. Obesity is defined as excessively high body fat in relation to lean body mass and overweight is defined as some deviation in body weight above a standard of acceptable weight (usually defined in relation to height). About 34 million adults in the United States were overweight between 1976 and 1980 and of these about 12.4 million were severely overweight (National Research Council, 1989). Claims of reduced calories were made for many products. Diet sodas, desserts, frozen dinners, salad dressings, and even snacks, baked goods, and light beers exhibited reduced calorie claims.

#### Reduced Fat Products

Various products such as spreads, salad dressings, frozen desserts, yogurt, cheese, milk, snacks, trimmed beef, and deli items attempted to increase sales by reducing, extracting, trimming, replacing, or otherwise getting rid of some portion of fat. In some cases, the marketing pitch emphasized no saturated fats, or no tropical oils. Cooking oils, such as Canola (made from rapeseed), Crisco, and olive oil have benefitted from the current emphasis on low saturated fats. Salad dressings have been another battleground for the consumer's favor. Four strong contenders are Kraft's "Free" salad dressing, Hidden Valley Ranch "Take Heart" salad dressing, Hellman's light mayonnaise, and Miracle Whip light mayonnaise. After consuming leafy greens, consumers often feel they deserve a dessert. Various national brands, such as Breyers and Simple Pleasures, provide reduced or no fat versions of frozen desserts. One of the most successful product lines of the last year has been Entemanns low-fat or fat-free baked goods. While each serving in a loaf cake has only 100 calories, the loaf is supposed to be precision-cut into 13 slices, a recommendation many consumers are apt to ignore.

#### Low Cholesterol Products

Various formulations of eggs and egg substitutes, mayonnaise, salad dressings, baked goods, and frozen dinners have been marketed as low cholesterol products at one time or another. Many prepared cake mixes are now labeled as low cholesterol products: mix ingredients have not changed but provided on the box is an alternate preparation method eliminating egg yolks.

#### High Fiber Products

High fiber products such as cereal, bread, dried fruit, fruits, vegetables, beans, and whole grains have benefitted from the recommendation to consume more dietary fiber. Included in this category are bran products, highlighted since Kellogg's Heartwise campaign began in 1985.

#### Low Sodium and Low Sugar Products

Finally, the last "healthy" product claims we will discuss are for low sodium and low sugar products. These include soups, nuts, snacks, baby food, frozen dinners, and bakery goods. The buyer, however, needs to read the labels carefully because of inconsistencies in the definition of "low" and "lite".

The emphasis on selling health to consumers, embodied in the foods that they purchase, has raised some extremely important policy issues. These pertain to nutrition labeling, to health claims, and finally to product reformulation and the adequacy of standards of identity. The previous speaker, Donna Porter, has discussed recent policy developments related to product labeling. Health claims and product standards are equally controversial. These are all issues with which food marketers, consumers, and policymakers will continue to struggle as more information about diet and health becomes available.



TABLE 1  
DIETARY GUIDELINES AND RECOMMENDATIONS

<u>Date</u>	<u>Source</u>	<u>Title</u>
1977	U.S. Senate (McGovern Committee)	Dietary Goals for the U.S.
1979	USDA	Building a Better Diet - Five Food Groups
1979	DHEW	Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention
1979	DHEW/NCI	Statement on Diet, Nutrition, and Cancer - Prudent Interim Principles
1980	USDA/DHHS	Dietary Guidelines for Americans
1980	DHHS	National 1990 Nutrition Objectives
1984	DHHS/NHLBI	Recommendations for Control of High Blood Pressure
1985	USDA/DHHS	Dietary Guidelines for Americans, 2 <sup>nd</sup> edition
1986	DHHS/NCI	Cancer Control Nutrition Objectives for the Nation: 1985 - 2000
1987	DHHS/NHLBI	National Cholesterol Education Program Guidelines
1988	DHHS/NCI	Dietary Guidelines for Cancer Prevention
1988	DHHS	The Surgeon General's Report Nutrition and Health
1989	NRC	Diet and Health - Implications for Reducing Chronic Disease Risk
1990	USDA/DHHS	Dietary Guidelines for Americans, 3 <sup>rd</sup> edition

Source: The Surgeon General's Report on Nutrition and Health, 1988.

TABLE 2  
SUMMARY OF DIETARY GUIDELINES

Component	Current Level in U.S. Diet (1987)	U.S. Senate (1977)	American Heart Association (1986)	Surgeon General (1988)	NRC (1989)	USDA/DHHS (1990)
Calories		Avoid being overweight	Maintain ideal weight	Achieve and maintain ideal weight	Maintain appropriate weight	Maintain a healthy weight
Fats (% kcal)	36-37	27-33	<30	Reduce consumption	<30	Choose a diet low in fat
Fatty Acids Saturated	13	8-12	<10	Reduce consumption	<10	Choose a diet low in saturated fat
Mono-unsaturated	14	10				
Poly-unsaturated	7	8-12	<10			
Cholesterol	300-450 mg/day	250-300 mg/day	<300 mg/day <100 mg/kcal	Reduce consumption	<300 mg/day	Choose a diet low in cholesterol

Source: NRC's Designing Foods, 1988; Surgeon General's Report on Health and Nutrition, 1988; NRC Diet and Health, 1989; USDA/DHHS Dietary Guidelines for Americans, 3<sup>rd</sup> edition, 1990.

TABLE 3  
CHRONIC DISEASES AND HEALTH CONDITIONS  
LINKED TO DIET

Anemia  
Atherosclerotic Cardiovascular Disease  
    Coronary Heart Disease  
    Peripheral Arterial Disease  
    Stroke  
Cancer  
Dental Caries  
Diabetes Mellitus  
Gastrointestinal Diseases  
Hepatobiliary Disease  
    Cirrhosis of the Liver  
    Gallstones  
Hypertension  
Infections and Immunologic Diseases  
Kidney Diseases  
Neurologic Disorders  
Obesity and Eating Disorders  
Osteoporosis

Source: Surgeon General's Report on Nutrition and Health, 1988;  
NRC's Diet and Health - Implications for Reducing Chronic  
Disease Risk, 1989.

TABLE 4  
ESTIMATED TOTAL DEATHS AND PERCENT  
OF TOTAL DEATHS FOR THE 10 LEADING  
CAUSES OF DEATH: U.S., 1987

<u>Rank</u>	<u>Cause of Death</u>	<u>Number</u>	<u>Percent of Total Deaths</u>
1	<b>Heart diseases</b>	759,400	35.7
2	<b>Cancers</b>	476,700	22.4
3	<b>Strokes</b>	148,700	7.0
4	Unintentional injuries	92,500	4.4
5	Chronic obstructive lung diseases	78,000	3.7
6	Pneumonia and influenza	68,600	3.2
7	<b>Diabetes mellitus</b>	37,800	1.8
8	Suicide	29,600	1.4
9	Chronic liver disease and cirrhosis	26,000	1.2
10	<b>Atherosclerosis</b>	23,100	1.1
All causes		2,125,000	100.0

**bold type:** Causes of death in which diet plays a role.

Source: Surgeon General's Report on Nutrition and Health, 1988.

**TABLE 5**  
**CANCER AND DIETARY LINKAGES IN THE U.S.**

Doll and Peto (1981) estimated that approximately 35% of all cancer *mortality* in the U.S. is linked to diet. Wynder and Gori (1977) estimated that 40% of cancer *incidence* among men and nearly 60% among women is related to diet.

<u>Type of Cancer</u>	<u>Positive Correlates</u>	<u>Negative Correlates</u>
Esophageal	Tobacco, alcohol, preserved foods	Lentils, green vegetables, fresh fruit, animal protein, several vitamins and minerals
Stomach	Salt preserved foods	Fresh fruits and vegetables, vitamin C
Colorectal	High fat intake (especially saturated fats), alcoholic beverages (especially beer)	Vegetables
Liver	Heavy alcohol consumption	
Pancreatic	Cigarette smoke	
Lung	Cigarette smoke	Frequent consumption of green and yellow vegetables
Breast	High calorie diet (especially fat), alcohol	
Endometrial	None established	
Ovarian	None established	
Bladder	Cigarette smoke, possibly coffee, artificial sweetener, and alcoholic beverage consumption	
Prostate	High fat diets	Possibly vitamin A (especially beta-carotene)

Source: NRC's Diet and Health - Implications for Reducing Chronic Disease Risk, 1989.



TABLE 6

## Diet Behavior

Q: What, if anything, are you eating more or less of to ensure that your diet is healthy?

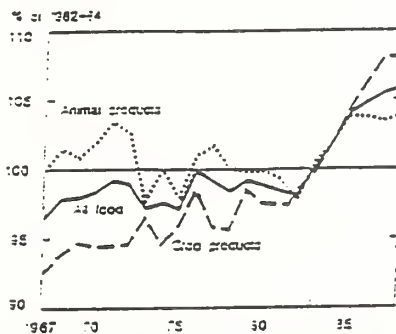
Base: The shopping public

		Jan. 1989 Total	Jan. 1990 Total
Base		1,031	1,005
More fruits/vegetables	%	59	57
Less meat/red meat	%	33	34
Less fats/oils	%	22	27
Less sugar	%	20	19
More chicken	%	16	19
More fish	%	18	18
More fiber	%	13	16
Less salt	%	13	15
Less cholesterol	%	12	15
Less fried foods	%	10	14

Source: Food Marketing Institute, 1990 Trends.

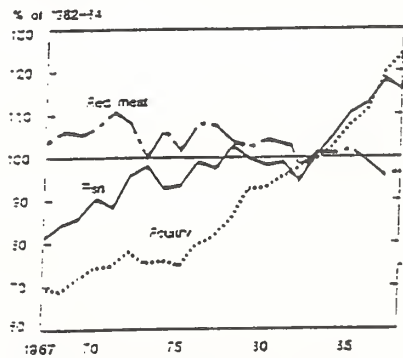
TABLE 7

Per capita consumption of food



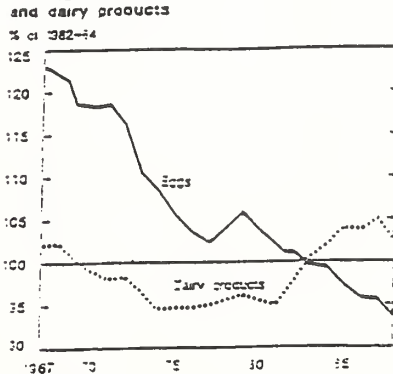
The following table shows the percentage change in per capita consumption of food products from 1967 to 1985. The data is based on the 1982-84 average.

Per capita consumption of red meat, poultry, and fish



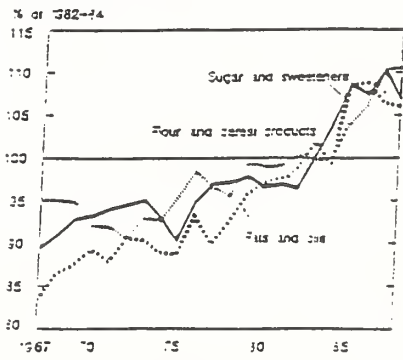
These figures are based on the 1982-84 average.

Per capita consumption of eggs and dairy products



These figures are based on the 1982-84 average.

Per capita consumption of selected processed products



These figures are based on the 1982-84 average.

Source: USDA, 1990 Agricultural Chartbook

**TABLE 8**  
**NEW PRODUCTS BEARING HEALTH CLAIMS**

	1988	1989	% increase
Reduced/low cal/lite	475	962	+102.5%
Reduced/low fat	275	626	127.7
All natural	215	274	27.4
Reduced/low salt	202	378	87.1
No additives/preservs.	153	186	21.6
Low/no cholesterol	126	390	209.5
Added/high fiber	56	73	30.4
Reduced/low sugar	52	188	261.5
Added/high calcium	4	27	575.0
Organic	98	140	42.8

Note: Category totals not additive; multiple claims.

Source: Prepared Foods, Gorman Publishing,  
Chicago, IL, 1990, p. 48.

**TABLE 9**  
**"HOT" FOOD PRODUCTS OF 1989-1990: HEALTHY AND CONVENIENT**

**10 BIGGEST GAINERS**  
(total product sales over \$100 million)

1. Natural snacks.....22.2%
2. Pretzels.....19.9%
3. Bottled Water.....16.8%
4. Formula.....16.5%
5. Corn/tortilla chips.....15.5%
6. Maple syrups.....14.0%
7. Plates and bowls.....13.8%
8. Peas, canned.....13.3%
9. Junior (baby food).....13.1%
10. Berries, canned.....13.0%

Source: Supermarket Sales Manual, Progressive Grocer,  
July 1990. p. 23

TABLE 10  
10 BIGGEST GAINERS BY \$ GAIN

1989 Product Categories with Sales over \$100 million  
(gain in \$ million)

o Meat.....	\$2,950.70
o Produce.....	\$1,843.96
o Deli.....	782.65
o Bakery foods, packaged.....	558.87
o Prepared frozen foods.....	546.10
o Carbonated soft drinks.....	521.20
o Ready-to-eat cereals.....	504.97
o Cheese.....	353.81
o Cigarettes.....	305.81
o Cookies.....	271.48

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1989 Product Categories with Sales under \$100 million  
(gain in %)

o Canned mixed vegetables.....	20.0 %
o Dry baby cereal.....	16.2
o Roasting bag and wraps.....	15.9
o Canned white potatoes.....	15.6
o Dried beans.....	15.2
o Canned carrots.....	14.7
o Paper table accessories.....	14.3
o Dried peas.....	14.1
o Freezer wrap items.....	12.7
o Meat extenders.....	12.4

Source: Supermarket Sales Manual, Progressive Grocer,  
July 1990, p. 23.

**TABLE 11**  
**NEW PRODUCT INTRODUCTIONS: MEAT, POULTRY, AND SEAFOOD**

	1987	1988	1989
LUNCH MEATS	71	70	69
FRANKFURTERS	23	27	23
BEEF, PORK, VEAL, AND LAMB	89	113	53
POULTRY	156	91	125
SEAFOOD	120	112	115
BACON, HAM, SAUSAGE	85	104	122
OTHER	37	31	25
TOTALS	581	548	532

Source: Prepared Foods, Gorman Publishing,  
Chicago, IL, 1990, p. 150.



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## **Nutrition Labeling: Current Status and Comparison of Various Proposals**

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[The authors were the former co-project directors of the IOM report Nutrition Labeling: Issues and Directions for the 1990s. These remarks represent only the authors' opinions on the issues reviewed and do not represent the opinion of the Institute of Medicine, National Academy of Sciences, the Library of Congress, the Congressional Research Service, or the U.S. Congress].

What a difference a year can make! A year ago, nutrition labeling policy in the U.S. was operating under a 1938 law, 1973 regulations, and 12 years of Federal legislation which was not enacted. About a year ago, Congress had introduced, but taken no action on nutrition labeling legislation; there were rumors of new proposed FDA-regulations and the Institute of Medicine Expert Committee was about to have its second meeting. Now we have a new law, the Nutrition Labeling and Education Act of 1990 (P.L.101-535); the first phase of proposed regulations have been published by FDA; USDA is considering revised nutrition labeling; and the IOM report has been released.

In the early 1970s the Federal Government embarked on its current policy of nutrition labeling, precipitated in part by the recommendations of the 1969 White House Conference on Food, Nutrition and Health. The policy at that time resulted in the voluntary program we are all familiar with, which included a specific list of nutrients and order of appearance on food labels. That policy which was progressive and seemingly far-reaching for the 1970's is, by comparison, outmoded and outdated by today's standards.

### Environment for Change

A number of developments in the last two decades have resulted in the current situation that suggests that reform in food labeling and particularly nutrition information on food labels was needed. These changes include the consensus in the field of nutrition that dietary patterns have a definite impact on long-term health of an individual and that changes in those patterns can have an

influence on health. This consensus was exemplified by the recommendations of the Surgeon General's Report on Nutrition and Health, and the NRC report Diet and Health: Implications for Reducing Risk of Chronic Disease. And further supporting this consensus is the 1990 edition of Nutrition and Your Health: Dietary Guidelines for Americans, released earlier this month, by USDA and DHHS. Coupled with this consensus on the relationship between diet and disease, and as a result of it, there has been increasing attention and desire by consumers for more nutrient information on the foods so that they can better select a healthful diet. One way to assist consumers in selecting more nutritious foods by providing them with more information on the nutrient content of the foods that they are eating, and one means of achieving this is to improve the information provided at the point of food selection.

By 1989, several events put changes in nutrition labeling in motion. In the spring of 1989 Congress introduced legislation that focused on reform of FDA's labeling program, which was subsequently enacted into law in November 1990. In August of 1989, FDA and USDA announced in the Federal Register an initiative to reform food labeling in a proposed notice of rulemaking which asked for public comment and announced hearings which were held in four major cities in the fall of 1989. By July 1990, FDA had proposed the first in a series of new food labeling regulations. In September 1990, the Institute of Medicine (IOM) of the National Academy of Sciences released a one-year study on the scientific and practical aspects of nutrition labeling reform, prepared at the request of the Departments of Health and Human Services, and Agriculture. The IOM Committee on the Nutrition Components of Food Labeling had been established to:

- o assess the implications of current knowledge of nutrition and health for food labeling;
- o recommend the content and appropriate format for food labels, taking into account the scientific data base as well as the means to communicate effectively with the public;
- o examine current laws and regulations governing ingredient and nutrition labeling; and
- o propose options for modifying current laws and regulations.

The IOM Committee identified a number of deficiencies in the current nutrition labeling system, including that nutrition labeling is not currently mandatory on all packaged food, nor required in conjunction with the sale of fresh food; nutrition panel information is not uniform across all food products; current labels carry information about some nutrients that should not be or do not need to be listed, while other nutrients are omitted; ingredient labeling is incomplete and misleading; current format is too confusing and complex; principal display panel disclosures of nutrient content are misleading and not based on established standardized definitions.

The IOM study, the July 1990 FDA proposed regulations, and the



Nutrition Labeling and Education Act of 1990 (P.L. 101-535, referred to hereinafter as the 1990 Act), address a number of the same issues on food labeling reform, such as foods covered by nutrition labeling, nutrient content information, label presentation options, and legislation and regulation. However, certain specifics of the proposals for change differ among these groups, with the IOM report (Nutrition Labeling: Issues and Directions for the 1990s) going further than either of the other efforts. This presentation will review the recommendations of the IOM study and describe the differences with the FDA and Congressional efforts on nutrition labeling.

#### Foods Covered by Nutrition Labeling

In the area of foods to be covered, the IOM report recommended that most packaged food be required to carry nutrition labeling. The Committee also recommended that infant foods, institutional packages, and commodity foods should carry nutrition labeling. It recommended exemptions for a few foods from this requirement (small packages, foods with no nutritional significance), only after all other possible alternatives had been exhausted. The FDA proposal and 1990 Act include these exemptions as well as others for specialized food products, food sold in restaurants or prepared in grocery stores, and institutional foods.

The IOM study recommended that fresh foods (produce, meat, poultry, and seafood) should be required to be sold with nutrition information provided at the point of purchase for the most frequently consumed products in each category. The report recommended that the agencies allow flexibility in the format and nutrient information required for the labeling of fresh foods for which they were responsible: FDA for produce and seafood; USDA for meat and poultry. The FDA proposal expressly includes nutrition labeling for produce and requests comments on seafood. The 1990 Act includes a provision for nutrition information to be provided for the 20 most commonly consumed items each in the produce and seafood categories. Meat and poultry were not included in either the FDA proposal or the new law since these products are under USDA's jurisdiction.

Because the American public is currently consuming so many meals away from home, the IOM report also recommended that restaurants be required to make nutrition information available to consumers. Limited-menu restaurants (e.g., fast food) would be required to provide information on package wrappers or in some other form at the point of purchase. Other restaurants would be required to provide a statement on their menus that nutrition information is available upon request. Additionally, the report encouraged restaurants to participate in programs that use descriptive symbols or terms on menus to allow consumers to choose more healthful menu items. The report also encouraged noncommercial food service settings to provide nutrition information. provided in . The FDA proposed rules and 1990 Act expressly omit foods sold in restaurants from providing nutrition

information. However, in October 1990, FDA and USDA met with industry representatives to discuss options for providing nutrition information in restaurants.

### Nutrient Content Information

The IOM study recommended that the following nutrient information be required to be added to the current nutrition information panel per serving: total calories from fat, saturated and unsaturated fat; saturated and unsaturated fat in grams; cholesterol in milligrams; and dietary fiber in grams. The report called for retaining calcium and iron, while at the same time eliminating the required listing of the percent of U.S. Recommended Daily Allowances (U.S. RDA) for protein and for vitamins A, C, thiamin, niacin, and riboflavin -- none of which are current public health concerns. The report's recommendations allow the optional listing of all micronutrients for which Recommended Dietary Allowances (RDA) exist, monounsaturated and polyunsaturated fats, complex carbohydrates and sugars, potassium, and calories from protein and carbohydrate components. The FDA proposal requires many of the same provisions, except it would allow the optional listing of unsaturated fatty acids and the calories from saturated, unsaturated, polyunsaturated and monounsaturated fatty acids, insoluble and soluble fiber content, while requiring the listing of vitamins A, C, calcium and iron. The 1990 Act contains similar provisions to the IOM study except only the amount of saturated fat (in grams) and the calories from total fat would be required while the listing of calories from saturated and unsaturated fat would be optional. In addition, the new law requires that the amount of complex carbohydrates and sugar contained in the product be listed in grams. The new law retains the listing of currently required vitamin and minerals for as long as they are determined to be of continued usefulness to consumers.

### Presentation of Label Information

Each of the current proposals or recommendations calls for serving size to be retained as the reference unit for providing nutrition information. The IOM recommended that the serving sizes be expressed in common household measures followed by weight in metric measures, with the serving size and the number of servings per container being rounded down to the nearest whole number, and that the agencies establish uniform serving sizes for a limited number of different food categories. FDA's proposed rules would require serving size to be stated in U.S. and metric units, with the option of also stating serving size in household measures. The agency has proposed standardized serving sizes for 159 food categories. The 1990 Act also requires that serving sizes be stated in household units appropriate for the food and be standardized for food categories.

With regard to dietary reference values, the IOM study recommended that the U.S. RDAs be updated using the values in the 10th edition of the RDAs. FDA has proposed that the U.S. RDAs be



replaced with RDIs (reference daily intakes) established for those nutrients for which an RDA exists. These values for specific nutrients would be adjusted for population-weighted means of dietary requirements. In addition, FDA has proposed that DRVs (daily reference values) be established for macronutrients based on current dietary recommendations so that a manufacturer could provide a nutrition profile for all the food components contained in the product. The new law does not specifically address the RDA issue.

The IOM study recommended that rigorous consumer testing should take place before any change is made in label format. Figure 1 provides an example of the current label. The IOM report, while not recommending a particular label format, provided several examples of the manner by which it's recommendations might appear. Figure 2 features the Committee's mandatory content recommendations. Figure 3 provides an example of the Committee's mandatory and optional content recommendations. This example begins to show how cluttered the label can become. Manufacturers would be unlikely to provide all this information, but might chose to declare those nutrients that highlight the attributes of a food product. Figure 4 provides a suggested layout for the Committee's mandatory and optional recommendations with information on the nutrient content "as prepared."

The IOM report also recommended that public and private consumer education initiatives would be needed to assist Americans to use the new labels. FDA has initiated labeling format studies using consumer focus groups and mall-intercept surveys to determine the most appropriate label format to be required on packages in the future. The 1990 Act requires that, within a year, the Secretary of DHHS propose revisions to the label format such that consumers can better understand the information that is to be conveyed.

The IOM study did not address the issue of health claims. However, it did address the use of nutrient content descriptors. For descriptors, the IOM Committee suggested a framework by which minimum benchmark values would be set for nutrients for which intake should be increased and maximum benchmark values would be set for those for which intake should be decreased. The framework is designed to allow statements concerning nutrient content to be standardized and rational in light of the recent proliferation of such terms and also to be supported by the information provided on the nutrition panel. FDA proposed regulations for health messages in a separate notice in February 1990, proposed tentative final rules for cholesterol descriptors in July 1990, and is planning to address definitions for other principal display panel descriptors in subsequent proposals. Regulations that have already been proposed will need to be repropoed under the new authority and with attention to specific provisions of the Nutrition Labeling and Education Act of 1990. The 1990 Act requires FDA to propose regulations that define certain descriptive terms and establish some reasonable control over the current proliferation of health claims.

2% LOWFAT MILK			
Nutrition Information Per Serving			
SERVING SIZE .....	ONE CUP		
SERVINGS PER CONTAINER ..	8		
CALORIES .....	120		
PROTEIN .....	8	GRAMS	
CARBOHYDRATE .....	11	GRAMS	
FAT .....	5	GRAMS	
SODIUM .....	130	mg	
Percentage of U.S. Recommended Daily Allowances (U.S. RDA)			
PROTEIN .....	20	RIBOFLAVIN .....	25
VITAMIN A .....	10	NIACIN .....	*
VITAMIN C .....	4	CALCIUM .....	30
THIAMINE .....	6	IRON .....	*
*CONTAINS LESS THAN 2% OF THE U.S. RDA FOR THESE NUTRIENTS			

FIGURE 1 Sample nutrition information panel for 2% lowfat milk under current FDA regulations (minimum requirements).

2% LOWFAT MILK		
Serving size .....	1 cup (8 fl oz)	
Servings per container .....	8	
Nutrition Information Per Serving		
Calories .....	120	
Total Fat .....	5 g	(45 kcal)
Saturated Fat .....	3 g	(27 kcal)
Unsaturated Fat .....	2 g	(18 kcal)
Total Carbohydrate .....	11 g	(44 kcal)
Complex Carbohydrate .....	0 g	(0 kcal)
Sugars .....	11 g	(44 kcal)
Protein .....	9 g	(36 kcal)
Total Dietary Fiber .....	0 g	
Cholesterol .....	20 mg	
Sodium .....	120 mg	
Potassium .....	430 mg	
A very good source (over 20% [standard]) of: Vitamin D, Calcium, Riboflavin, Phosphorus.		
A good source (11-20% [standard]) of: Vitamin A, Vitamin B12.		
Contains (2-10% [standard]): Vitamin B6, Vitamin C, Magnesium, Pantothenic Acid, Thiamin, Zinc.		

FIGURE 3 Potential nutrition label incorporating the Committee's mandatory and optional content recommendations.

2% LOWFAT MILK	
Serving size .....	1 cup (8 fl oz)
Servings per container .....	8
Nutrition Information Per Serving	
Calories .....	120
Total Fat .....	5 g (45 kcal)
Saturated Fat .....	3 g (27 kcal)
Unsaturated Fat .....	2 g (18 kcal)
Carbohydrate .....	11 g
Protein .....	9 g
Total Dietary Fiber .....	0 g
Cholesterol .....	20 mg
Sodium .....	120 mg
A very good source (over 20% [standard]) of: Calcium.	

FIGURE 2 Potential nutrition label incorporating the Committee's mandatory content recommendations.

MACARONI & CHEESE DINNER			
Serving size (as prepared) .....		3/4 cup (50 g)	
Servings per container .....		4	
Nutrition Information Per Serving			
	As Packaged	As Prepared	
Calories .....	190	290	
Total Fat .....	2 g (18 kcal)	13 g (117 kcal)	
Saturated Fat .....	1 g ( 9 kcal)	9 g (81 kcal)	
Unsaturated Fat .....	1 g ( 9 kcal)	4 g (36 kcal)	
Total Carbohydrate .....	36 g (144 kcal)	34 g (136 kcal)	
Complex Carbohydrate...	30 g (120 kcal)	28 g (112 kcal)	
Sugars .....	6 g (24 kcal)	6 g (24 kcal)	
Protein .....	9 g (36 kcal)	9 g (36 kcal)	
Total Dietary Fiber .....	1 g	1 g	
Cholesterol .....	5 mg	5 mg	
Sodium .....	425 mg	525 mg	
Potassium .....	850 mg	900 mg	
<b>As Packaged</b>			
A very good source (over 20% [standard]) of: Niacin, Riboflavin, Thiamin.			
Contains (2-10% [standard]): Calcium, Iron.			
<b>As Prepared</b>			
A good source (11-20% [standard]) of: Riboflavin, Thiamin.			
Contains (2-10% [standard]): Vitamin A, Calcium, Iron, Niacin.			

FIGURE 4 Potential nutrition label incorporating the Committee's mandatory and optional content recommendations for macaroni & cheese dinner, as packaged and as prepared.

The IOM study included recommendations concerning the need to improve analytical methods to provide more comprehensive nutrition information about food products. The report recommended that the agencies should allow the use of data base information for fresh food and foods sold in restaurants rather than direct laboratory analysis. This alternative would require the agencies to certify data from the USDA National Nutrient Data Bank or other appropriate sources. Methods verification and quality control are needed for analyzing samples with nonofficial methods. The IOM Committee pointed out that funding is needed for the development of improved analytical methods, establishment of programs for testing methods, development of additional standard reference materials, and expansion of the USDA National Nutrient Data bank. Specific recommendations on analytical methods were not made in either the FDA proposal or the 1990 Act.

### Legal Authority

FDA's proposal states that the agency believes that it has the authority under existing statutes to require nutrition labeling on packaged foods and to expand coverage to produce and seafood. The IOM report suggested that explicit legislative authority would lay to rest any doubts that FDA and USDA have the authority to require mandatory nutrition labeling and to expand the requirement to foods that are not now covered. However, a change in the law was not viewed as imperative and the agencies could proceed under existing authority to implement the recommendations made by the Committee. The 1990 Act provides specific authority for FDA-regulated products and mandates certain information to be provided for foods that are sold with nutrition information. No legislation has been introduced to address providing comparable authority for USDA.

### The Future

Having come this far in the last year, the question that now arises is: where are we and where do we go from here?

WHERE WE ARE IS: One agency (FDA) has explicit authority for nutrition labeling. However, that agency also has already proposed new regulations on the first series of rules that must now be re-proposed under the new authority. The FDA labeling format studies are currently underway. The agency has the recommendations from the IOM study as it proceeds to develop the proposed regulations for labeling issues yet to be addressed.

WHERE WE ARE GOING FROM HERE: there are certain things that need to be addressed in order for a comprehensive, harmonized system of nutrition labeling to be implemented and used effectively. The things to consider are:

1. whether comparable legislation needs to be enacted to grant USDA similar authority to that of FDA; such legislation might also include coordination of authority over certain issues, such as defining descriptors;



2. consideration should be given to whether there is a way to better coordinate the regulation of health claims made in labeling and advertising ( this issue has all ready been the subject of several Congressional hearings); and

3. the development of a nutrition education program to assist consumers to effectively use new nutrition labels and other nutrition information provided at the point of purchase.

In sum, a lot has been accomplished in the last year. The substance of the recommendations among the three entities addressing changes in nutrition labeling are fairly similar. However, there are some differences that will be important to certain parties who will be affected by nutrition labeling reform. Attention to the details of the IOM report, the FDA proposals, and possible changes in USDA policy during the comment and rulemaking process will be important in determining the nutrition labeling regulations that will carry us into the 21st century. The ultimate goal of nutrition labeling reform efforts is to provide consistent, readable, understandable, and usable food labels that enable consumers to make more healthful food choices. The last year's activities in nutrition labeling have been described as a horse race with much speculation as to who would win: FDA, Congress, or the IOM Committee. We have to hope that the winners will ultimately be the American people.

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**Outlook '91, Session C15**

**For Release: Wednesday, November 28, 1990**

**1990/91 OUTLOOK FOR FLORICULTURE PRODUCTION  
AND GREENHOUSE AND NURSERY TRADE <sup>1</sup>**

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I will review the recent trends and outlook first for U.S. and world trade in greenhouse and nursery products and then secondly for U.S. production, supplies, and consumption.

***World Greenhouse/Nursery Trade Prospects***

**World Trade is Expanding Rapidly**

International trade in greenhouse and nursery products during the 1980's has risen rapidly and is expected to continue on a fast track in the 1990's. World imports of greenhouse and nursery products, including cut flowers, cut foliage (decorative greens), live plants, and bulbs, totaled \$2.5 billion in 1982 but is forecast to reach \$6.5 billion this year (figure 1). World trade in horticultural products will exceed \$10 billion by 1995 based on expanding demand stemming from the recent political developments in Europe, continued growth in global economies, and reductions in trade barriers.

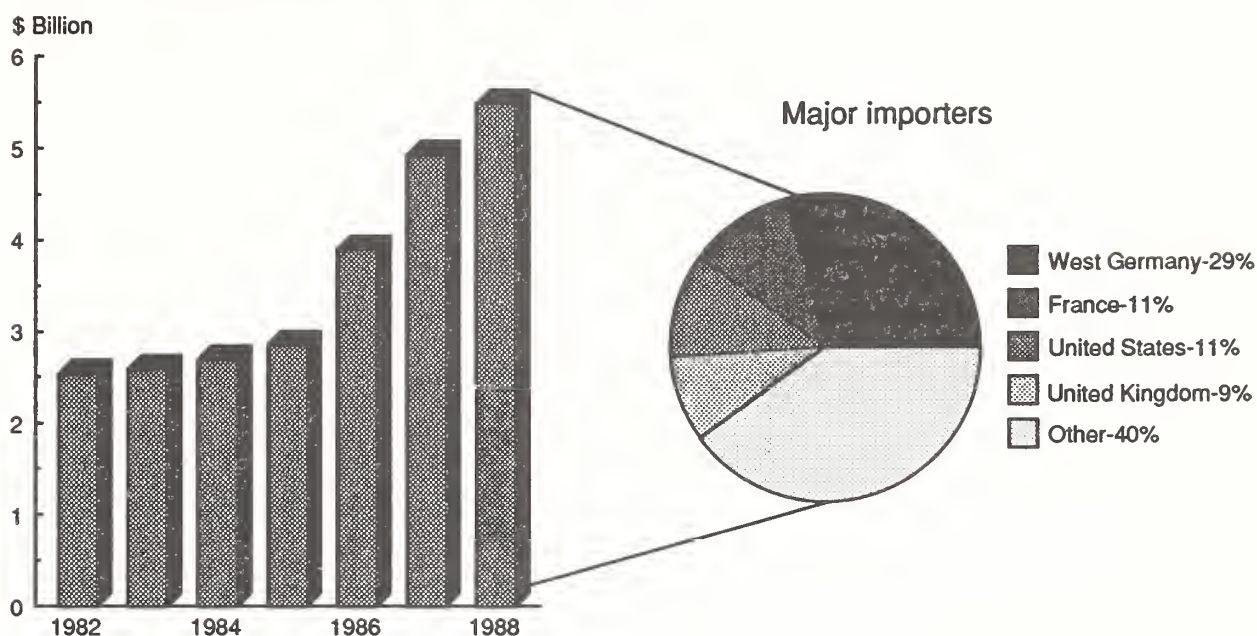
**World Imports of Cut Flowers Doubled in Last Six Years**

World imports of cut flowers doubled from \$1.25 billion in 1983 to \$2.5 billion in 1988 and are projected to hit \$3 billion this year. West Germany and the United States are the leading importers while the Netherlands and Colombia are the leading exporters. If new international trade agreements are reached, including the proposed U.S.-Mexico Free Trade Agreement, impetus will be added to the current rate of growth in U.S. and global trade of cut flowers as well as other horticultural products.

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<sup>1</sup> In this report, the term "horticultural products" is used synonymously with "greenhouse and nursery" products and excludes food products.

**Figure 1**  
**World Imports of Greenhouse/Nursery Products**



### **World Imports of Cut Decorative Greens Up 100 Percent in Four Years**

Cut decorative green imports world-wide jumped from \$150 million in 1984 to \$300 million in 1988 and are projected to total \$350 million in 1990. West Germany, the Netherlands, and the United States are the leading world buyers of cut greens with the United States also being the dominant supplier. Expansion in the trade of cut flowers will cause similar increases in trade of cut decorative greens as both are used in the preparation of retail floral arrangements.

### **World Trade in Live Plants Will Grow the Fastest in the 1990's**

International trade in live plants has grown dramatically in the 1980's and is expected to be the strongest growth category for the 1990's. World imports of live plants totaled nearly \$2.1 billion in 1988, almost double 1985's level. World imports in 1990 are estimated to exceed \$2.5 billion.

Some countries which export to the United States have requested an expansion of the list of plants currently allowed entry under Q-37, the U.S. Plant Protection and Quarantine Act. Such an expansion could lead to a substantial increase in U.S. imports of live plants and plant products.

Table 1--World greenhouse and nursery imports: Value and major importers, 1988

Subsector	Value of imports	Share of total	Increase 1981-88	Major importing countries and combined share of total imports 1/	
	1,000 dollars	-----Percent-----			
Cut flowers 2/	2,520,250	46.0	114	(68)	West Germany, United States, France, United Kingdom
Cut greens 3/	298,440	5.4	108	(74)	West Germany, Netherlands, United States, Switzerland
Live plants 4/	2,074,000	37.8	146	(57)	West Germany, France, United Kingdom, Italy
Bulbs 5/	589,023	10.8	79	(58)	Italy, West Germany, United States, France
Total	5,481,713	100.0	120	(60)	West Germany, France, United States, United Kingdom

1/ Figures in parentheses are percentages of total imports for the four major countries listed.

2/ Leading cut flower exporters in 1988 and their percentages of total were: Netherlands (61), Colombia (11), Israel (5), and Italy (4).

3/ Leading cut green exporters in 1988 and their percentages of total were: United States (20), Italy (16), Denmark (14), and Canada (9).

4/ Leading live plants exporters in 1988 and their percentages of total were: Netherlands (49), Denmark (13), Belgium (10), and West Germany (6).

5/ Leading bulb exporters in 1988 and their percentages of total were: Netherlands (88), France (2), Peru (2), and West Germany (1).

Note: These data include most major importing countries, but several countries, especially centrally planned countries, are not included.

Source: United Nations Comtrade Data System.

### World Bulb Imports in the 1980's Made Strong Growth

World imports of bulbs, corms, and tubers also experienced strong growth, increasing from about \$300 million in the early 1980's to an estimated \$650 million this year. Demand is expected to continue strong in this decade for bulbs, especially for flowering perennials. The United States will continue to be the major world buyer of bulbs and the Netherlands, the major world supplier.

The United States imports a wide variety of bulbs from many different countries for use by commercial growers for cut flower production as well as flower bulbs used by consumers for garden plantings and indoor forcing. U.S. imports of bulbs will total approximately \$100 million this year, up 10 percent from 1989. U.S. production and exports of bulbs are also growing.



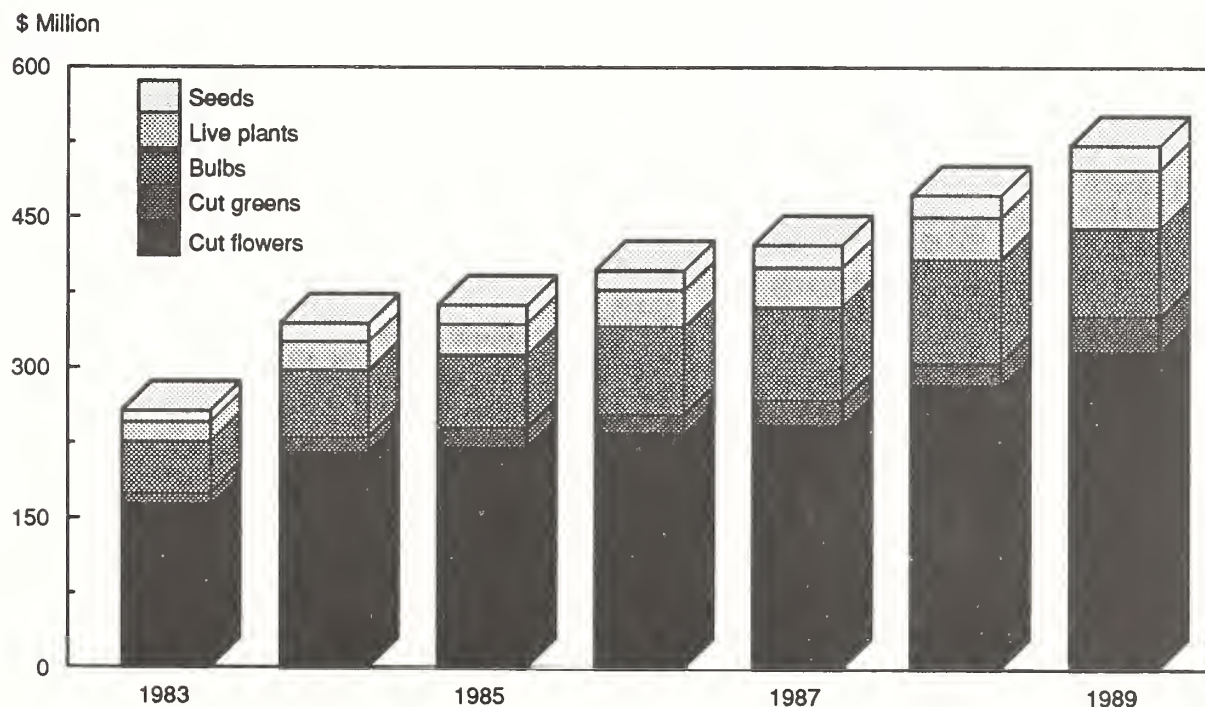
## ***U.S. Greenhouse/Nursery Trade Prospects***

### **U.S. Imports Will Climb Faster than Exports**

The value of U.S. imports of greenhouse and nursery products exceeded \$500 million last year, more than twice the level in 1983. Strongest growth areas have been cut flowers and bulbs (figure 2). The value of U.S. imports in 1990 is projected to increase 6 percent from 1989. However, quantities of imported products are increasing faster than the corresponding values. These trends are expected to continue in this decade but would accelerate if new multi-national or bi-lateral trade accords are reached. U.S. imports of live plants can be expected to grow rapidly but imports of cut flowers and decorative greens will also quicken.

U.S. exports of greenhouse and nursery products rose 39 percent from 1983 to 1989. Moderate growth in all product categories is the outlook but new reductions in tariffs and trade barriers for U.S. products sold in Europe and the Far East would stimulate U.S. exports, particularly for cut flowers and greens, and live plants. The U.S.-Canada Free Trade Agreement is expected to increase trade between the two countries in flowers, green and blooming plants, and nursery stock. U.S. imports from Canada so far in 1990 are slightly above last year while U.S. exports to Canada are also higher, especially for fresh cut ornamentals, herbaceous plants, and nursery products.

Figure 2  
**Greenhouse and Nursery Products: Value of U.S. Imports**



A major reason for the increase in consumer demand for cut flowers has been the greater availability year-round and large diversity of products. Most of the rise in total supplies has come from foreign sources. In 1988, imports reached nearly 3 billion stems, a 29 percent increase over 1985's total of 2.2 billion stems. Last year, imports fell slightly to about 2.8 billion stems because of plant quarantine problems with Colombian flowers and also production problems in Colombia. However, this year imports are up 18 percent which will result in about 3.3 billion stems imported. Total supply (domestic production plus imports) in 1989 was an estimated 5 billion stems (56 percent imported) compared with a forecast of 5.5 billion stems this year (60 percent imported).

Table 2--U.S. imports of fresh cut ornamentals, 1985 to 1989 and indicated 1990 1/

Item	1985	1986	1987	1988	1989	Indicated 1990	Change 1990/1989**
-----1,000 stems-----							Percent
Alstroemeria	33,132	57,571	66,351	81,470	69,088	80,940	17.2
Carnations	715,376	837,214	916,712	933,161	817,172	1,027,427	25.7
Carnations, min. 2/	102,480	170,916	220,644	281,004	277,692	299,447	7.8
Chamaedorea 2/	344,976	359,219	456,925	411,250	320,150	323,365	1.0
Chrysanthemums	38,988	26,817	24,445	26,097	27,978	31,407	12.3
Pompon chrys. 2/	411,336	455,802	466,590	508,278	427,128	534,694	25.2
Daisies	16,662	19,717	20,258	20,157	25,575	20,219	-20.9
Freesia	34,131	34,294	32,911	31,008	30,716	26,705	-13.1
Gerbera	19,040	18,216	30,945	32,620	30,266	31,246	3.2
Gladioli	3,917	3,721	3,987	3,155	3,730	4,499	20.6
Gypsophila 2/	15,176	19,509	26,341	36,477	54,404	60,013	10.3
Iris	28,872	25,872	26,279	25,059	29,038	24,356	-16.1
Leatherleaf	0	2,940	3,043	880	445	118	-73.6
Lilac	968	1,632	1,214	275	210	179	-14.9
Lilies	32,803	32,629	32,775	31,587	34,381	31,962	-7.0
Miscellaneous ferns	14,454	8,745	12,243	6,626	5,657	6,784	19.9
Orchids, cymbidium	2,684	2,210	3,720	5,297	3,631	6,445	77.5
Orchids, others	11,908	14,595	14,132	12,867	22,876	23,974	4.8
Roses	173,151	217,022	263,849	287,169	314,180	410,259	30.6
Statice 2/	30,402	48,033	54,243	57,942	61,623	63,331	2.8
Tulips	58,116	59,036	55,525	38,594	68,478	72,215	5.5
Other ornamentals	106,882	99,468	121,750	145,461	198,504	262,104	32.0
TOTAL	2,195,454	2,515,178	2,854,882	2,976,434	2,822,922	3,341,689	18.4

\*\* Percentage change based on USDA inspections through September 29.

1/ Does not include imports from Canada.

2/ Revised from bunches to stems.

Source: Federal-State Market News Service tabulations of Plant Protection and Quarantine Offices inspections, U.S. Department of Agriculture.

Table 3--Greenhouse and nursery products: Value of U.S. imports,  
selected countries, 1989 1/

Country of origin	Bulbs	Live plants	Cut flowers	Cut greens	Total 2/
--1,000 dollars--					
Canada	5,267	36,840	3,759	29,747	75,613
Mexico	---	1,090	9,978	4,625	15,693
Colombia	---	237	186,595	---	186,832
Costa Rica	53	6,991	8,824	---	15,868
Ecuador	---	---	7,222	---	7,222
Peru	---	3	4,181	19	4,203
Guatemala	---	1,790	2,591	1,471	5,852
Honduras	---	989	43	34	1,066
Jamaica	2	717	956	124	1,799
Belgium	1,538	275	19	---	1,832
France	9	266	2,823	862	3,960
Italy	2	---	1,588	1,548	3,138
Netherlands	75,543	4,549	67,660	721	148,473
United Kingdom	1,293	171	661	109	2,234
India	39	18	647	783	1,487
Israel	100	263	2,169	94	2,626
Gaza Strip	2,403	267	1,028	244	3,942
Philippines	---	1	86	892	979
China	132	38	530	1,089	1,789
Thailand	1	196	4,017	738	4,952
Taiwan	107	140	2,491	2,106	4,844
Japan	479	1,377	8	172	2,036
Australia	14	132	942	265	1,353
New Zealand	100	412	783	84	1,379
Other countries	974	2,167	6,053	2,257	11,451
Totals	88,056	58,929	315,654	47,984	510,623

--- = No data reported.

1/ Only countries with \$1 million or more were selected.

2/ Includes all Chapter 6 items reported by the Harmonized Tariff  
Schedule of the United States: Live trees and other plants; bulbs,  
roots, and the like; cut flowers and ornamental foliage; excludes seeds.

Source: U.S. Department of Commerce.

Table 4--U.S. imports of cut flowers and cut decorative greens: Country of origin, 1989 1/

Crop	Colombia	Netherlands	Mexico	Ecuador	Honduras	Costa Rica	Others
--Percent--							
Alstroemeria	93	5	--	--	--	--	2
Carnations, std.	94	--	2	1	--	--	3
Carnations, min.	79	--	4	6	--	4	13
Chamaedorea	--	--	79	--	--	--	21
Chrysanthemums	68	14	9	11	--	1	7
Pompons	86	--	1	2	--	9	2
Daisies	4	--	96	--	--	--	1
Freesias	6	93	--	--	--	--	1
Gerbera	65	17	--	--	--	4	18
Gladioli	--	55	34	--	--	--	11
Gypsophila	36	--	--	34	--	--	30
Iris	--	98	1	--	--	--	1
Leatherleaf	--	--	--	--	100	--	--
Misc. ferns	--	--	--	--	12	33	55
Lilac	--	100	--	--	--	--	--
Lilies	12	81	--	--	--	2	5
Orchids, cym.	--	69	--	--	--	--	31
Orchids, other	--	2	--	--	--	--	94
Roses	71	4	11	8	--	1	5
Statice	40	--	28	17	--	--	15
Tulips	--	96	--	--	--	--	4
Other ornamentals	28	30	6	2	--	9	25

-- = Nil or negligible.

1/ These data do not include imports from Canada.

Source: Federal-State Market News Service tabulations of Plant Protection and Quarantine Offices inspections, U.S. Department of Agriculture.

## ***U.S. Production, Supply, and Consumption Prospects***

### **Production is Widespread and Diversified But Shifting Demographically**

All fifty States have some commercial production of greenhouse and nursery crops. Last year, 18 States exceeded \$100 million each in grower cash receipts, compared with only 9 States in 1980. Most production is concentrated in the Pacific Coast States, the South, the Southeast, and the Northeast. Production is shifting towards those States where the population is growing most rapidly, generally in the West and the South. However, it is also evident that now there are more growers producing a wider diversity of crops in more geographical locations than there were ten or twenty years ago. In California, where 530 commercial agricultural crops are grown, 249 are greenhouse and nursery crops.

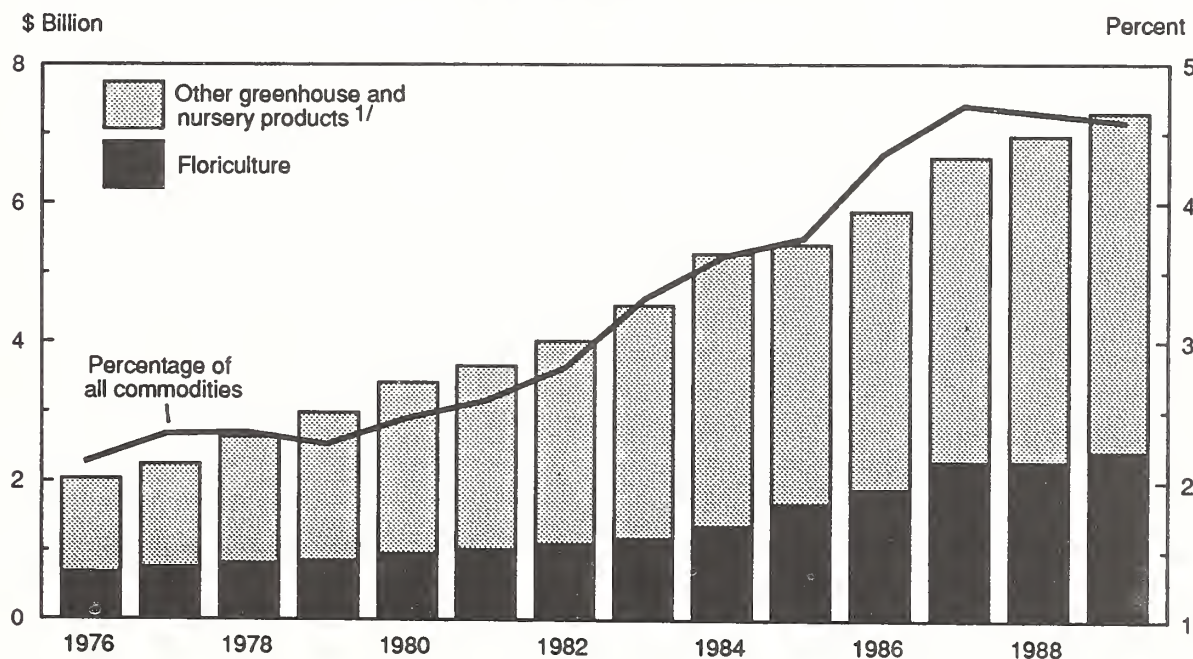


## Cash Receipts Growth Will Out-pace the Inflation Rate

The U.S. greenhouse and nursery industry is one of the fastest growing sectors in U.S. agriculture, in spite of rapidly increasing foreign competition. In 1976, grower cash receipts were about \$2.0 billion or 2 percent of all farm commodity receipts. By 1989, grower receipts more than tripled to \$7.3 billion or 5 percent of all farm receipts (figure 3). While cash receipts for many agricultural commodities have declined, the greenhouse and nursery sector has continually grown. The horticulture sector has averaged nearly 10 percent growth per year during the 1980's and more than 12 percent per year during the 1970's. The industry has had this success without direct federal subsidization.

The greenhouse and nursery sector, as a commodity group, now ranks seventh among all farm commodities. Demand continues very strong for greenhouse and nursery crops. Hence, cash receipts are expected to continue to grow faster for the next several years than the general rate of inflation. Prospects in 1991 are for an overall rate of growth in the greenhouse and nursery sector in the range of 4-6 percent per year with greenhouse crops averaging 1-2 percentage points above this range and nursery crops averaging 1-2 percentage points below this range. This is a very favorable outlook for horticulture when compared with the expected growth in the GNP of only 1 percent. The outlook beyond 1991 is for an improved rate of growth.

Figure 3  
**U.S. Greenhouse and Nursery Cash Receipts**



1/ Excludes food crops, seeds, and Christmas trees.

Table 5--Greenhouse and nursery crops: Wholesale value of U.S. production, supply, and consumption, 1986-89

Subsector and year	Production and trade 1/				Consumption 1/			
	Domestic production	Imports	Total supply	Exports 2/	Total	Per capita	Annual change	U.S. share of domestic sales
	-----1,000 dollars-----				Dollars	--Percent--		
Cut flowers: 3/								
1986	404,299	234,895	639,194	18,500	620,694	2.57	N/A	62.2
1987	493,790	243,609	737,399	18,610	718,789	2.95	15.8	66.1
1988	514,443	283,505	797,948	19,760	778,188	3.17	8.3	63.6
1989	526,969	315,652	842,621	27,500	815,121	3.32	4.7	61.3
Potted flowering plants: 3/								
1986	492,059	11,334	503,393	27,173	476,220	1.98	N/A	97.6
1987	647,049	13,661	660,710	23,857	636,853	2.62	33.7	97.9
1988	642,697	15,813	658,510	32,208	626,302	2.55	-1.7	97.5
1989	661,366	19,913	681,279	44,834	636,445	2.59	1.6	96.9
Foliage plants: 3/								
1986	613,381	21,206	634,587	20,942	613,645	2.55	N/A	96.5
1987	606,273	21,866	628,139	25,006	603,133	2.48	-1.7	96.4
1988	566,625	22,328	588,953	31,578	557,375	2.27	-7.6	96.0
1989	560,393	28,071	588,464	43,957	544,507	2.22	-2.3	94.8
Bedding plants: 3/ 4/								
1986	622,362	N/A	622,362	N/A	622,362	2.58	N/A	100.0
1987	821,116	N/A	821,116	N/A	821,116	3.37	31.9	100.0
1988	839,179	N/A	839,179	N/A	839,179	3.41	2.2	100.0
1989	963,787	N/A	963,787	N/A	963,787	3.92	14.8	100.0
Cut cultivated greens: 3/								
1986	86,387	19,130	105,517	5,451	100,066	0.42	N/A	80.9
1987	99,406	24,350	123,756	5,560	118,196	0.49	18.1	79.4
1988	101,979	21,632	123,611	7,746	115,865	0.47	-2.0	81.3
1989	111,061	15,684	126,745	10,782	115,963	0.47	0.1	86.5
Other greenhouse and nursery products: 5/								
1986	3,664,564	71,527	3,736,091	9,716	3,726,375	15.46	N/A	98.1
1987	3,987,530	72,458	4,059,988	13,497	4,046,491	16.62	8.6	98.2
1988	4,303,773	85,891	4,389,664	11,990	4,377,674	17.81	8.2	98.0
1989	4,471,047	146,985	4,618,032	16,690	4,601,342	18.72	5.1	96.8
Total greenhouse and nursery products:								
1986	5,883,052	358,092	6,241,144	81,446	6,159,698	25.55	N/A	94.2
1987	6,655,163	375,944	7,031,107	85,905	6,945,202	28.53	12.8	94.6
1988	6,968,695	429,169	7,397,864	105,922	7,291,942	29.67	5.0	94.1
1989	7,294,622	526,305	7,820,927	143,763	7,677,164	30.92	5.3	93.1

N/A = Not available.

1/ Dollars expressed at equivalent wholesale grower level. 2/ Exports estimated based on U.S. and Canadian trade statistics. 3/ Wholesale values of production have been expanded by the ratio of commercial data reported in 28 major States to the U.S. Census of Agriculture. 4/ Minor quantities of imports and exports included in other greenhouse and nursery products. 5/ Includes turfgrass (sod), bulbs, nursery stock, groundcovers, and other greenhouse and nursery products not estimated separately in above categories except seed crops, cut Christmas trees, and food crops grown under cover.

Source: "Floriculture and Environmental Horticulture Products: A Production and Marketing Statistical Review, 1960-88," SB-817, September 1990, ERS, USDA.

## **Outlook for Floriculture and Environmental Horticulture Mixed**

Floricultural crop production has continued to expand in all regions and categories. One exception is potted foliage plants which have recently experienced declining sales. The strongest growth areas have been potted flowering plants and bedding and garden plants, including hanging baskets. Certain potted and bedding plant crops continue to increase in price as well as quantity sold. Prospects are excellent for sales growth of flowering annuals and perennials in plugs and other unfinished plants as well as finished plants in pots, flats, and other containers.

Although the U.S. cut flower and cut decorative green market has expanded, domestic output for some items, such as chrysanthemums and carnations, has been curtailed due to stiff competition from imports. The outlook is excellent for specialty cut flowers including exotics and tropical species. Market statistics indicate that there has been some demand substitution of the major traditional cut flowers, most notably carnations, chrysanthemums, and gladioli, by other kinds of fresh cut flowers. Demand for roses is expected to continue on its upward trend at a steady, moderate rate. Some flowers have gained considerably in popularity including orchids and other tropicals and "Dutch" types such as alstroemeria and gerbera. Although the dried ornamentals market (including dried flowers, woody ornamentals, and grasses) appears to be expanding, substantially larger quantities of imported products have dampened domestic producer prospects. Sales of some cut cultivated and non-cultivated greens have recently slowed as a shift in product use by retailers appears to be taking place.

Environmental horticulture (nursery) production made substantial gains during the last decade. However, if the predicted further slow-down in the U.S. economy occurs, the outlook for nursery crops will be less favorable for the next year or two. Consumer demand for landscaping plants, including container and field-grown stock, sod, and other nursery products, will depend heavily on housing and other types of construction. Consumer discretionary income, which stems from general economic growth, will be the primary factor determining demand for nursery products. On a positive note, the nursery industry will benefit economically from a provision in the 1990 Farm Bill referred to as the America the Beautiful Program, or the tree-planting initiative. Although this will primarily affect urban plantings of seedlings there will be some carry-over effect on sales of container and field-grown stock.

## **Highlights of Trends and Changes to Come in the U.S. Floral Market**

I now want to turn our attention to a more detailed look at the U.S. cut flower industry. Consumers spent an estimated \$12.6 billion on floral and plant items in 1989 compared with \$5.7 billion in 1982. On a per capita basis, that's \$51.00 per person vs. \$24.50, just seven years ago. Consumer expenditures will grow even faster in the 1990's.



One primary reason for the consumption increase is the jump in the number of florist as well as non-florist retail outlets. Combined, supermarkets and retail florists numbered 65,700 nation-wide last year--about 14,300 more outlets than in 1986. Seventy-eight percent of all supermarkets stocked cut flowers last year compared with only 33 percent in 1974.

The wholesale value of the U.S. supply of fresh cut flowers (domestic and imports) continues to climb and is forecast to reach \$900 million this year. Wholesale values of supplies for carnations, chrysanthemums, and gladioli have stabilized during the past three years but the quantities continue to increase. The quantity and value of supply of cut roses and many other cut flowers continue on an upward trend (figure 4).

Last year the total supply of cut roses hit 900 million stems (figure 5). In 1990, imports to date are up 31 percent and total supply, including a modest increase in domestic output, will near the 1 billion stem mark. Domestic production of cut carnations is expected to fall slightly but imports have risen 21 percent resulting in a total supply of about 1.7 billion stems, 15 percent higher than 1989.

The supply of cut chrysanthemums fell last year due to lower domestic production and imports. However, this year imports of pompon chrysanthemums alone have jumped 100 million stems and imports of standard chrysanthemums are also up sharply. Domestic output of cut "mums" this year is expected to fall significantly.

Figure 4

### Cut Flowers: Wholesale Value of U.S. Supply

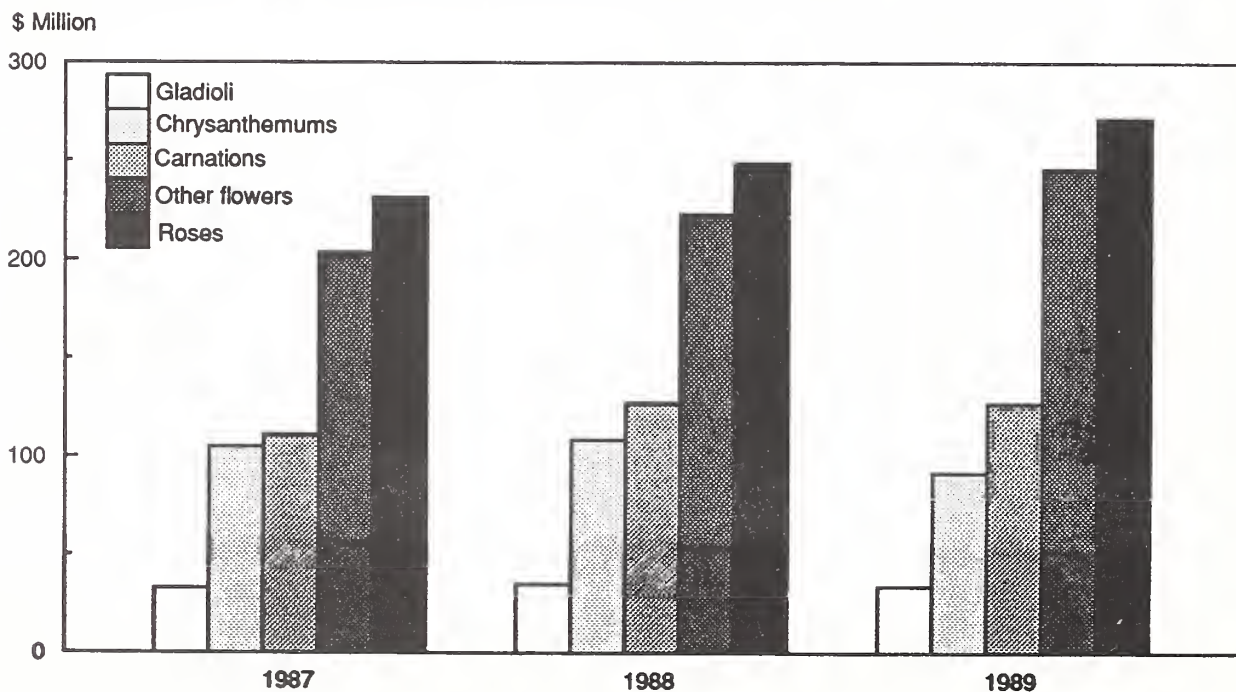
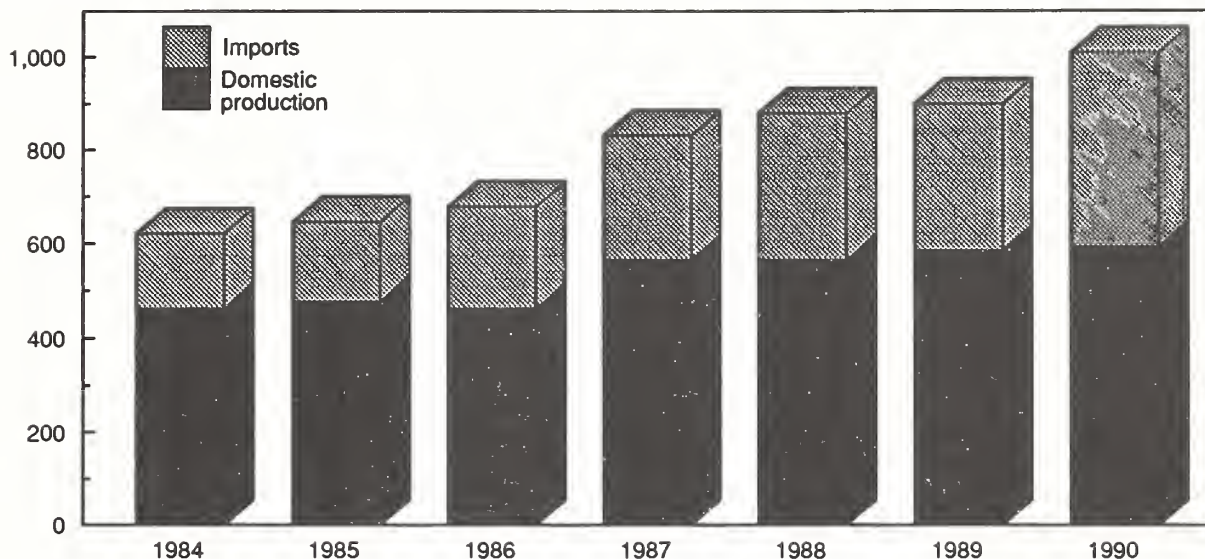




Figure 5  
**Total U.S. Supply of Roses**

Million stems



1990 estimated.

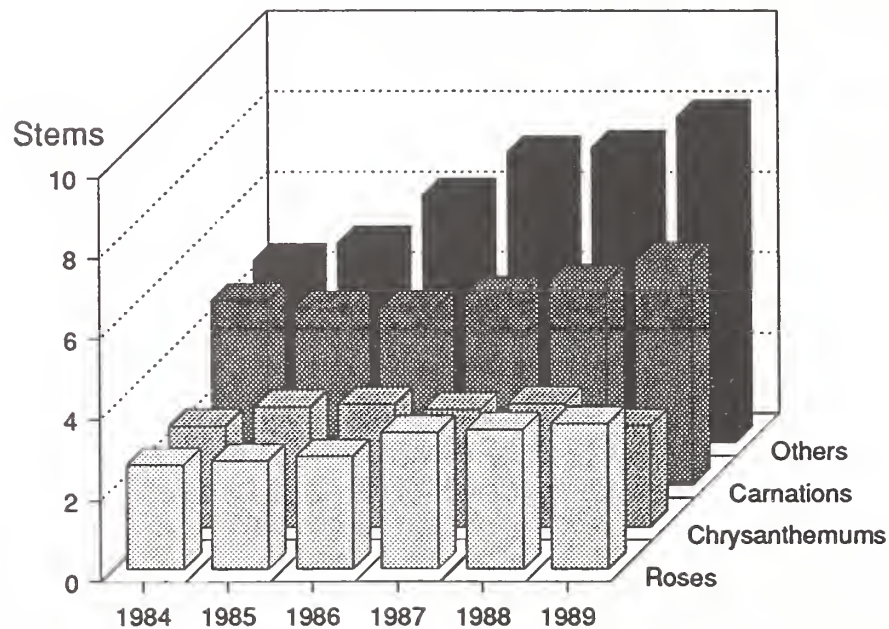
### **U.S. Per Capita Consumption of Cut Flowers Increased 40 Percent in Five Years, But is Still Low Globally**

Per capita consumption of cut flowers in the United States has risen at the rate of about 1-2 stems per person per year or 8 percent annually during the past 5 years. Per capita consumption of all cut flowers last year reached 20 stems per person (figure 6). However, consumption rates in other developed countries are much higher than in the United States. For example, consumption in Japan and the United Kingdom was 40 stems per person during 1987. Consumption in most European countries is 2-3 times the U.S. level while the world leader is the Netherlands with 145 stems purchased per capita in 1987. In terms of retail dollars, U.S. per capita expenditures for cut flowers in 1987 was \$18 compared with \$35 per person in the Netherlands.

Although U.S. market supplies will expand significantly, indications are that the U.S. market will likely grow substantially more in quantity than it will grow in consumer expenditures. This implies that real prices will fall as supplies increase. However, lower prices will further stimulate consumer demand. Some market studies indicate that the U.S. market could expand by as much as 50 percent between 1987 and 1992 and by an additional 50 percent between 1992 and 1997.

Figure 6

## Per Capita Consumption of Cut Flowers



U.S. consumption of cut roses has increased from 2.6 stems per person in 1984 to 3.6 stems in 1989. The 1990 forecast is nearly 4 stems per person due to the large influx of imports. Consumption of carnations from 1984 to 1989 has risen moderately from 4.6 to 5.6 stems per person while consumption of chrysanthemums has remained unchanged at 2.5 stems per person. Consumption of all other cut flowers has doubled during the past 5 years from 4 stems to 8 stems per person. These trends are expected to continue in the 1990's with consumption of specialty and novelty cut flowers climbing faster than consumption of the traditional cut flowers (roses, carnations, chrysanthemums, and gladioli).

U. S. imports to date in 1990 are higher than last year for alstroemeria, gerbera, gypsophila, orchids, statice, and tulips. Imports of some other specialty cut flowers and ferns are substantially higher this year. Hawaii is also shipping more anthuriums, Birds of Paradise, heliconia, protea, ginger, and orchids to the U.S. mainland.

## ***Many Critical Issues Face the U.S. Greenhouse and Nursery Industry***

Growers, wholesalers, retailers, and industry-related suppliers will meet many challenges during the 1990's in the production and marketing of floricultural and nursery crops. The short-term outlook for the U.S. greenhouse and nursery industry is very good, but long-term prosperity and even survival will require technological advances and innovative approaches involving the participation of industry, educators, and government. .

- o All will need to expand or develop their competitive positions to face increasing supplies and lower prices in domestic and international markets while striving to lower costs of labor, energy, and other inputs. This will require new production technology, crops, and delivery and marketing systems which will boost productivity and consumer demand. The industry must continue to improve its efficiency in order to compete against cheaper imports and to competitively price its exports in foreign markets.
- o Trade reforms, including the GATT talks and agreements with countries in Latin America or other world regions will have enormous impacts on the U.S. greenhouse and nursery industry.
- o Legislative actions on taxes, employment laws, pesticide usage and other environmental issues will be paramount to effective and profitable business operations.
- o Income developments including global economic growth and changes in financial markets will substantially enhance or hinder world trade and consumption. Rapid changes in exchange rates could boost U.S. imports and make our exports more expensive or, conversely, curb U.S. imports and lower our prices in foreign markets.
- o New State and National programs to organize production and marketing efforts and develop markets will be critical to the industry's long term economic well-being. Industry self-help programs such as the proposed PromoFlor and the National Floral Fund would benefit all industry participants. This will also be advantageous for industry organization and provide for better unity on issues and answers to policy questions. Of critical importance will be promotion programs to increase consumer demand and research programs to develop new products and information systems for sound decision making.



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## ALTERNATIVE GARDEN CROPS FOR THE 21ST CENTURY

Henry M. Cathey  
Director, U.S. National Arboretum

Gardening/landscaping has entered the new decade with a different set of priorities set by the use and abuse of our GLOBAL GARDEN. Our bedding plant industry has grown stronger with each decade emphasizing instant color (50,60's), tropical foliage (70's), and perennials (80's). The decade of the 90's will be dominated by the planting of 1 billion new trees in the United States to help combat the "Global Warming Trend" first identified in the 80's.

Any program on such a massive scale with the top priority of our government and citizens will also have great impact on any plant grower:

- o KNOWLEDGE: We have already perfected the growing systems of environments, media, fertilizers, and pest control methods to produce a superior plant--any plant of commercial value.
- o PROFESSIONALISM: We have also created an "elite group" of growers and facilities to produce in accelerated culture any high-valued plant.
- o TECHNOLOGY: We have on call and in ever-aggressive positions businesses (large/small) to provide the supplies, equipment, legally registered chemicals, and distribution systems to support an ever-expanding plant production.
- o TECHNICAL SUPPORT: Professional Plant Grower Association (PPGA) and many other organizations such as Society of American Florists (SAF), Ohio State University (OSU), and American Association of Nurserymen (AAN), provide short courses to the interested growers for access to the latest research findings and the implementation steps into practical growing procedures.

The propagation of 1 billion trees, however, will put great pressure on our entire production, distribution, and educational programs to insure that the trees will live and then accomplish their tasks of reducing the level of carbon dioxide in the atmosphere and reverse the warming trend of the "GREENHOUSE EFFECT."



A number of programs which I have put into place at the U.S. National Arboretum (USNA) and related activities over the last 10 years will be important players in facilitating the plant developments in the 90's.

- o STANDARDIZED NAMES: The USNA has set the standard for the correct Latin and common names for all landscape plants. These names have been coded by the American Association of Nurserymen (AAN), and will be the way to Latinize the grower to use the correct name and ultimately help create useful databases of what is available and what can be used. The information is available from AAN on a constantly-expanding computer tape.
- o USDA PLANT HARDINESS ZONE MAP: Plants have been traditionally classified as to their ability to survive winter temperatures and are used as the first step in creating a hardy landscape. I coordinated the updating of a new hardiness map for North America, first in 25 years. The new zone map is available from the Government Printing Office (GPO). Misc. Publication 1475: stock number 001-000-04550-4 for \$6.50.
- o USNA BOOK OF OUTSTANDING GARDEN PLANTS: The garden book of the decade was written by Jacqueline Heriteau in cooperation with the staff and consultant of the USNA. It is a first: a plant finder database of 106 lists suggesting the most beautiful, durable, and carefree plants for a specific use.

All are characterized as to zone rating, light, moisture, growth rate, and ultimate size. All plants are cross referenced to other lists of flowers, grasses, aquatics, ground covers, shrubs, and trees for a total landscape. Simon and Schuster have made the book available to every outlet and book and book club/service.

- o PLANT PERFORMANCE GUIDE: We are still accumulating the information about where landscape plants are flourishing in North America. Ultimately to be based in GRIN (a germplasm database of ARS/USDA), the information reported by volunteers will build towards a total reappraisal of when plants can be grown in North America. It will be another 3 to 5 years before this information will come on line. We are still seeking additional information/contributors.
- o NEW NATIONAL GARDENS: The USNA, on its 444 acre site in Washington, D.C., has installed or has plans to build the prototype garden for the 21st century. The completed gardens include bonsai, penjing, herbs, wild flowers, aquatics, conifers, shrubs, trees and perennials. Under design and development are urban gardens for song birds, valleys of wild collected plants from Asia, groves of native state trees, suburban gardens in the New American Friendship style of Oehme and van Sweden and 15 small container gardens in an abandoned brickyard. The gardens in the brickyard will be created and coordinated in conjunction with PPGA.

- o NEW LANDSCAPE PLANTS: The primary research objective of the USNA is to collect, test, breed, select, evaluate nationally/internationally, and introduce elite trees, shrubs, and ground covers. We seek high-risk projects which cannot be undertaken by private industry but require complex research leadership and expertise to accomplish. Thus far we have introduced almost 200 new plants. Many new ones are in the pipeline for introduction in the 1990's. We also continue to collect new cultivars/wild plants overseas (England/Japan/Korea/Russia/China) to increase the diversity of the collections at the USNA and serve as a repository for future generations. All of plants are documented in our herbarium and are entered into our germplasm base.
- o COORDINATION: Also in the 1980's, I have continued my involvement with the D.C. Kiplinger Chair in Horticulture at the Ohio State University (Columbus, Ohio) to create directories of where the researchers are located and the interests they practice. DIRECTORY 4, "An International Guide to Floricultural Researchers" will be available late in 1990. I have also compiled DIRECTORY 1 for the Horticultural Research Institute as a guide to the nursery-oriented researchers in the U.S. It will be available only on a floppy disc to be used as a menu driven database to more than 400 individuals. It will be available from AAN, Washington, D.C., in late 1990.
- o MEDIA: I have for almost 9 years conducted a 2-hour phone-in radio show on an ALL-TALK AM Station in Washington, D.C. I answer "live" about 30 callers each show. I hear directly what are their concerns and also their ever changing interests. The questions/answers are turned into a biweekly column in the WASHINGTON TIMES by Jacqueline Heriteau.

Over the 10 past years, I have records suggesting that I have answered more than 15,000 inquiries. Washington is only one of many markets in North America. The interest in and need for accurate, practical, and sensible answers still goes almost untapped by our industry.

#### OUR GLOBAL GARDEN: Alternatives

The gardens of the 1990's will be driven by three overpowering concepts:

PERENNIALIZATION: Every gardener wants their plant to thrive past one episode of flowering. This triggered the interest of perennials in the 80's. It will continue into the 90's with many previously overlooked plants becoming preferred for their long seasons of display.

CONTAINERIZED: The successful transition of any plant into a garden depends on producing truly healthy plants with instant acclimatization into the new site. Gardeners can now plant a garden any time the ground is not frozen and have long-lived success. We will have to learn, however, to grow and market plants only in environmentally-compatible materials and avoid non-biodegradable contaminates of landfills/garbage.

DIVERSIFICATION: We have trends to centralize or eliminate from our plant product lines all but the biggest sellers, with the recent interest in longer seasons of display and the urban meadow landscaping being installed instead of passive lawns. The botanical diversity of any species has again become of commercial interest. These plants have survived in collectors' gardens, cemeteries, and public gardens. They are being made available again from "niche growers." The new methods of plant propagation allow for the rapid increase of any valued cultivar. We are also recollecting in the wild and finding many new candidates for domestication.

Alternatives for the 21st century:

Crops already in the process of being made available:

1. Speciality cut flowers for fresh/dried marketing
2. Herbals for traditional uses
3. Decorative foliage and branches
4. Forcing flowering/fruiting branches ahead/out/in season
5. Hanging baskets: with water holding gels to reduce stress

Crops that have not been traditionally produced by the bedding plant industry, but could be profitable as alternative plants to market:

1. Native trees/shrubs - collected from the area where they will be replanted back into the same microclimate

- A. Need:
1. Botanist to identify exceptional native plants
  2. Seed/cutting collectors
  3. Cooperating conservation groups to contract growing
  4. Cooperating nursery to grow in nursery until landscape size

- B. Objective: Most native plants are grown from seed sources of unknown origin.

2. Native Wildflowers - collected from the area where they will be replanted back into the same microclimate

- A. Need:
1. Botanist to identify exceptional wildflowers
  2. Procedures to germinate seeds
  3. Cooperating conservation groups to fund plant production and distribution

- B. Objective: Most wildflower seeds, particularly in mixture do not persist for even a year. There must be greater attention given to regionalization and the adaption of wildflowers to growth regions.

3. Native and exotic grasses - as alternative to ground covers--  
must be stress/pest tolerant, non-invasive, and sterile

- A. Need: 1. Botanist to identify species involved  
2. Horticulturist to test and select elite forms  
3. Micropropagation techniques to have available sufficient numbers of plants  
4. Cooperating landscapers to begin to use grasses in public and private sites
- B. Objective: Plants that will be tolerant of reduced maintenance schedules in gardens will command premium prices as heat, stress, limited water availability, and the interest in creating a perennial garden.

4. Summer flowering shrubs - for all season flower color and seed heads

- A. Need: 1. Collect related species and cultivars of woody plants which flower on current season's growth  
2. Examples: Buddleia (Butterfly Bush), Caryopteris (Bluebeard), Hydrangea (Hydrangea), Lagerstroemia (Crape Myrtle), and Vitex (Chaste tree)  
3. Clonally produced plants preconditioned with light/CO<sub>2</sub>/ nutrients to insure early, continuous, and reflowering  
4. Sold in full flower as an instant color spot
- B. Objective: Only plants which flower on current season growth can provide continuous color. Plants may be winter hardy and cut to the ground each year or may be replaced at the beginning of each growing season.

5. Heat tolerant tropicals - for sun and shade

- A. Need: 1. Collect related species, cultivars, and mutations of vividly colored and dramatically shaped tropical plants which can be used in garden over summer and overwintered in frost-free holding houses

Examples: Acalypha, Brassaia, Codiaeum, Cordyline, Graptophyllum, Pseuderanthemum, Pandanus, Polyscia, Sanchezia, Pedilanthus as well as the variegated forms of Bougainvillea, Hibiscus, and Manihot

2. Clonally produced plants preconditioned with light/CO<sub>2</sub>/nutrients to provide instant color/form in the garden--plants remain in non-biodegradable



container, plunged into garden, twisted frequently to prevent the planted rooting into the media

3. Sold for addition to any bed, container, or planting site
4. Requires infrequent removal of shoot tips, side shoots to maintain desired form

B. Objective: Create vivid/dramatic displays not dependent on flowers or periods favorable for growing. Displays dependent only on foliage/stems/form.

6. Clean air machines - fitted with special containers with charcoal

A. Need: Approach is based on NASA  
Research: Used to cleanse indoor environment of gases

B. Objective: Utilize specially designed containers/plants/growing systems to clean up the environment.

7. Critter food plants - supply on a recurring basis plants that will attract birds, butterflies, and other critters as entertainers in the garden

- A. Need:
1. Work with naturalists to identify the favored foods and hosts for song birds
  2. Work with entomologists to identify the flowers favored for feeding and the life cycle of butterflies and moths
  3. Propagate and prime plants to go into the environment which will selectively attract the desired species of critter
  4. Produce replacement plants for those consumed by the critters; also produce ones which are not attached for alternative decoration/design

B. Objective: Accelerate the restoration of an environment and the return of its full flora and fauna. These plants could be very high valued/prized plants in the future. Introduced critters and food sources may be the only way to have song birds and butterflies in an otherwise disturbed site.

8. Biomass/Recycling plants - provide plants which are rated as having the highest CO<sub>2</sub> fixation over a season and produce the maximum amount of biomass for low input wood chips for energy-efficient heat generation in a home
- A. Need: 1. Grow fast-growing vegetation on the edges of lots, empty lots, shared/common land under powerlines for biomass production
2. Use composted vegetable matter from urban areas to maintain fertility
3. Harvest wood each season, chips compost or burn all vegetation produced each season
4. Select trees/shrubs from windbreak/pulp clones developed by forestry
- B. Objective: Provide the plants to turn every homestead into a sustainable entity which reduces rather than add pollutants and refuse on the supported community.
9. Sustainable agriculture - plants will be needed to supply the small alternative crop producers who will be producing their crops without benefit of special structures, pesticides, commercial fertilizers, equipment or heavy equipment
- A. Need: 1. A grass program is emerging in America for citizens who wish to farm the land and produce plant products for farmers, markets and roadside stands
2. Only the toughest plants will thrive under such unprotected culture
3. National clearinghouses/organizations are being funded to identify which plants can be grown successfully under these conditions and will return an acceptable cash return on the investment of time and labor
4. Coordinate sales of plants through cooperatives produced on contract
- B. Objective: Supply plants which will create environmentally acceptable uses for long neglected land and create a source of funds for the operators/farmer/trucker.

10. Plants to monitor the quality of the environment - regardless of the sensitivity and precision of the measuring equipment, plants are always the final indicator of the toxic agents in the environment
- A. Need:
1. Propagation of indicator plants which are particularly sensitive to a specific pollutant, particulate, or radiation
  2. Propagation in containment facilities to insure the standardization of the sensitivity of the detection process
  3. Produced in cooperation with environmental awareness groups and distributed to them for use
  4. Educational service for schools and civic groups to test their own environment
- B. Objective: Industry becomes active players in helping to define the status of our urban environment.
11. Heritage plants - revival in the interest of old roses or the creation of roses which look old fashioned but actually possess the vigor and tolerances of the modern hybrids will spread to other garten, foliage, and cut flowers. The "so called" unimproved look is gaining wide acceptance in plantings around historic homes such as victorian or colonial inspired architecture.
- A. Need:
1. Collect the diversity of long neglected, but once favored species from collectors, cemeteries, and farms
  2. Work with speciality groups to help select which plants are the ones worthy of propagation and distribution
  3. Work with public display gardens and mail-order catalogs to let the garden see the plants and where they can purchase them nationally
- B. Objective: Recreate the heritage of a long-gone America for future generations.

12. Distribute plants of other countries, traditions of their world - a visit to a grocery store in Washington reveals the background of our suburban population. They are from all around the world and try to grow and consume many kinds of vegetables, greens, and spices.
- A. Need:
1. Identify citizens from around the world who are living in your community and grow the plants which are a part of their traditions
  2. Work with civic groups and embassies to locate sources of seed and plants, special requirements for culture, and how they should be presented in the market
  3. Speciality plants would also have great appeal for sale to restaurants
- B. Objective: Diversification plants available to be grown in a community. Each of these ALTERNATIVE CROPS will permit professional plant growers to apply their already established skills and procedures to the production of new species. Each must find their own niche to market the plants to a specialized segment of gardeners. Each growing establishment will benefit from the billion of trees to be planted. We can put the "thousand points of color" in between the "thousand points of light and shade."



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## RISING DEMAND FOR HORTICULTURAL PRODUCTS

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A review of the projections by various members of the horticultural community substantiates the existence of a widely held opinion that horticulture will continue as a strong growth industry. Such a review also underlines the limited amount of hard data available on which to base projections.

From New Horizons, a publication of the Horticulture Research Institute which as a division of the American Association of Nurserymen, we read:

According to U.S. Department of Commerce Census of Retail Trade, 1982-1987, sales of U.S. garden centers and lawn/garden supply stores increased 88.3% over the previous five years, or little more than twice the rate (43.8%) of all U.S. retail trade. Most significant, 1982-1987 per capita garden center sales growth of \$10 (from \$12.39 to \$22.35) equals an average \$2 per person additional expenditure each year. This is twice the annual increase from 1977 to 1982.

The National Landscape Association's membership are expecting an increase of 16.7% in 1990 including the following average increases: New residential landscaping at 9.8%; new commercial landscaping at 7.9%; residential renovation at 15.3%; commercial renovation at 5.1%; residential maintenance at 16.1%; and commercial maintenance at 12.3%.

The Society of American Florists contributed insight on trends from industry sources including Florist's Review and Flowers&:

Floral industry statistics comparing 1988 with previous years reveal a healthy, though increasingly competitive market. When inflation is taken into account, the floral-item market has grown by 46% since 1982 and florists' retail sales advanced by 32%.

Per capita consumption of floriculture products is increasing in the United States and other industrialized countries and is predicted to continue to do so.

The National Gardening Association's annual gardening survey conducted by the Gallup Organization is slightly less optimistic in reporting growth trends in backyard gardening:

Gardening activities are steady while retail sales are up 5% in 1989 according to the results of the 1989-90 national gardening survey. Overall, 75% of the 92.8 million households in America or an estimated 70 million households, participated in one or more types of indoor and outdoor lawn and garden activities in 1989 compared to 76% or 69 million households in 1988 and 78% or 70 million in 1987. They estimate that U.S. households spent an average of \$245 each on their lawns and gardens in 1989 compared with \$227 in 1988 and \$251 in 1987.

Although a significant increase in market analysis is needed to obtain an accurate picture of changes in the consumer demands for horticultural products, there are major trends in our society which will undoubtedly sustain and potentially increase this demand.

The buying power of baby boomers is expected to double over the next 15 years. As the population ages, demand for luxury goods will increase rapidly. People will have more income available to spend on discretionary items. This translates into an expanding market for not only retail florists but also other businesses offering such discretionary products. The 1990's is projected to be favorable for these businesses in retail sales as well as services.

According to Wayne Dickson, President of Dickson, Felix and Associates, many of the baby boomers in the 1980's were insecure consumers who used their buying as a way to define their identity. They no longer need "badges of belonging" like BMWs, Club Med, etc. The emphasis has shifted from the quantity of possessions to the quality of life. Most importantly, the new adult of the '90's will be directing more purchases toward home improvement and will concentrate on products which do not harm the environment.

This powerful baby boom generation will mature into the world's first senior boom. These seniors will be fit, active and many will be well off. This represents enormous opportunity for the garden business. In addition, he predicts that the family unit is emerging in the 1990's as a strong, tight-knit market which is an ideal target for gardening and there are enormous opportunities for growers, manufacturers and retailers working together to sell the "new family" on gardening.

Although most people agree that the real value of plants lies in their impact on life quality, the horticulture industry and scientific community traditionally focus on crop production, sales, and maintenance. However, interdisciplinary research on the human aspects of horticulture is beginning to focus on peoples' response to plants. By refocusing the scientific and commercial goals of horticulture in terms of the people who use the plants, it is possible for researchers and members of the horticulture industry to gain a new perspective on the value of plants and to use that information to enhance life quality and increase consumer demand for plants.

According to Larry Scovotto, Past Executive Vice-President of the American Association of Nurserymen, "The horticulture industry is in the enviable position of marketing a product that is good for peoples' mental and physical well-being....And the more that it is used, the better it is for the environment. Research which is focused on these issues can serve only to benefit both our industry and the users of horticultural products."

In April of this year, researchers from such diverse fields as psychology, geography, anthropology and horticulture met in Virginia at the Symposium on the Role of Horticulture in Human well-Being and Social Development. Research reported there indicates that plants may have as important a role in our psychological and social well-being as their acknowledged role in providing food and shelter. Research discussed in this paper is based on presentations at the symposium which will be available in proceedings to be published by Timber Press (Portland,OR) in spring of 1991. Discussion will be divided into four categories: plants and the work place, plants and leisure time pursuits, plants in residential and community values, and plants and human health.

#### PLANTS AND THE WORK PLACE

Dana Parker, a Longwood Graduate Fellow, reports that both the Codex Corporation and the John Deere Company point to high quality design and the landscape as their most important recruiting tool. The Deere atrium is noted as one of the best of its kind for enhancing the work environment. Management noticed an increase in productivity, morale, and pride in the workplace but have not quantified this change.

Research from related fields gives indication that plants in and around the work place could have restorative value to employees. For example, the work of Rachel and Stephen Kaplan at the University of Michigan indicates that wilderness experiences are valuable restorative experiences that lead to recovery from mental fatigue and that the garden experience has striking similarities. Although research has not yet been conducted to determine the restorative value of landscapes around the workplace for use by



employees, Stephen Kaplan expresses his belief in the beneficial effect as he describes the factory worker who races off during the lunch period, fighting traffic and distractions, to find a spot in the shade of a tree for a peaceful break. If the peaceful effect would have been totally worn off by the time the return trip is made at the end of the hour, would one repeat this ritual tomorrow? A landscape around the factory would be much more accessible to the workers for lunch and breaks.

From her study of the effect on stress level of viewing urban scenes with vegetation versus urban scenes without vegetation, Mary K. Honeyman, a graduate student at Kansas State University, concluded that urban vegetation presented important psychological benefits. Her results showed a reduction of stress for groups which viewed scenes with vegetation in them and an increase in stress for those who viewed urban scenes without vegetation.

Many of us are familiar with the message of the Plants for Clean Air Council regarding the improvement of indoor air quality by plants. However, researchers have found indications that the symptoms of sick-building syndrome seen in some employees cannot be accounted for by actual pollutants. Instead they appear to be related to anxiety, stress, or mental fatigue. Additional research will be needed to determine if strategic use of flowers and plants in the workplace can have positive effect on worker health, morale, and productivity from both a physical and a mental perspective.

Another example of the potential impact of plants on employee physical comfort was demonstrated by Virginia Lohr, at Washington State University. She conducted an informal test to see if plants could be used to reduce the itchiness of skin caused by low levels of relative humidity. Offices may have humidity below 20 percent in winter, but 30 to 60 percent is recommended for individual comfort. In her informal study, 7 plants (1/4 cubic meter of green matter) raised the humidity of a 35-cubic meter space (about the size of my office) from a slightly dry 25 percent to a just-acceptable 30 percent. Perhaps another hanging basket or two in an office would simultaneously reduce dry skin and stress experienced by workers.

The use of plant material in the workplace can also play an important role in community relations for corporations. In a particularly innovative approach to establishing a corporate garden, the Rhododendron Species Foundation on the property of Weyerhaeuser Corporation is a not-for-profit foundation which receives land, funds, and facilities from the corporation. This partnership provides double benefits to the corporation in terms of employee accessibility and satisfaction as well as higher tax benefits. In addition, corporate gardens can become important community resources for recreation, education, and cultural



opportunity, significantly increasing their prestige and role in the community.

Despite the trend toward corporate gardens as a philanthropic activity, there is little data to substantiate their cost/benefit impact upon the corporation. Such information could be valuable in justifying similar expenditures by less well endowed companies or governmental offices.

#### PLANTS AND LEISURE TIME PURSUITS

Plants at work or around the home appear to be valuable to enhance life quality and pleasure in daily pursuits. In a recent study conducted cooperatively by the National Garden Association and Virginia Tech University, the Gallup Organization found that 40 percent of Americans reported feeling calmer and more relaxed around plants, and 37 percent agreed that one of the most satisfying aspects of gardening is the peace and tranquility it brings. In the same survey, over 50 percent of the households in America reported flowers and plants at theme parks, historic sites, golf courses, and restaurants are important to their enjoyment of visiting them.

Within this context, Mike Evans, Associate Professor, Hotel, Restaurant & Institutional Management at Virginia Tech University, conducted an economic study at Opryland Hotel. He reports that the hotel has one of the largest investments in indoor and outdoor gardens in the U.S. There are currently 25 acres of outdoor space and 12 acres of indoor space with approximately 18,000 indoor plants (600 species) valued at well over \$1 million. The annual horticulture budget to maintain this living investment is approximately \$1.2 million. A staff of approximately 52 tends to the plants year 'round.

He cites several examples of how the hotel's "greatscapes" have had a positive impact on the financial success of the hotel. These include an unusually high annual room occupancy rate of 85 percent, numerous awards, and the continued expansion of the complex. One other positive impact is that rooms overlooking the gardens are always the first to be reserved by repeat guests. These rooms generally command a premium price of at least \$30 over rooms that do not offer garden views (1990 Average Daily Rate of \$149 per room vs. \$179 per room with view of garden). This translates into an additional \$7 million room revenue per year.

From apple blossoms to zucchini festivals, people flock to see flowers and vegetables. Cut-your-own Christmas tree farms and "poinsettia pyramids" bring out the winter tourist. People are spending discretionary dollars to enhance their quality of life through plants. As tourism continues to grow and influence the economy in this country, research into ways that people value

plants holds potential for greatly expanding the horticulture industry, particularly in light of the fact that many of the tourists will come from Europe and the Orient, regions known for having outstanding interest in plants.

#### PLANTS IN RESIDENTIAL AND COMMUNITY VALUES

Plants in the landscape influence both the desirability of an area as a place to live and the economic value of a residence to a potential purchaser. Plants also appear to exert a positive influence on people's attachment to their community and the pride and responsibility they express.

"The Value of Landscaping," Weyerhauser's 1986 study, reports that a Gallup Organization poll found buyers of both new homes and previously owned homes estimated that landscaping adds an average of 14.87 percent to the value of their home. Weyerhauser also reports that among real estate appraisers, 95 percent say that landscaping adds to the dollar value of residential real estate and 99 percent state that it enhances sales appeal, yet only 34 percent of them include a specific dollar value for landscaping when making an appraisal.

Planned communities, townhouse and condo developments, time-shares, and retirement communities will become increasingly important housing options as our population grows and the over-55 age group seeks a change of lifestyle. The landscape may be a major factor in making a decision as to which community to choose. Researchers cited by Rachel Kaplan have identified easy access to nature, particularly trees, as the strongest predictor of peoples' satisfaction with their neighborhood.

Bruce Hull, Associate Professor of Architecture at Texas A&M University, makes an excellent case for the use of plants to develop a bonding or attachment by residents for their community and create many positive benefits including increased health and wellbeing. Arbor Day, street tree plants, planting a tree for the birth of a child or as a memorial to a deceased relative are examples of activities that enhance community feeling.

In a study to determine the importance of the landscape to the residents of retirement communities, Charlene Brown, Assistant Professor of Landscape Architecture, Virginia Tech University, 38 percent of the people selected the community to which they retired because of the grounds environment - the largest determining factor in selection. In addition, 99 percent expressed the feeling that pleasantly landscaped grounds were important to their quality of life in retirement.

Although anecdotal rather than research-based, participants related cases in which trees, flowers and vegetables have made important

contributions to urban life by reducing crime and developing community spirit. Charles Lewis from the Morton Arboretum related his years of experience in working with high-rise public housing garden projects in both Chicago and New York. The crime rate in high-rise towers is high because people have little opportunity to get to know each other. to know who belongs in a building, or to develop a sense of belonging themselves. Tenant gardens around the building become focal points where residents can meet each other, work together, and create a cooperative attitude. In one high-rise complex, vandalism was controlled because residents joined together to patrol the garden -- mothers would sit with their babies near the plots, children would take turns watching, and residents in higher apartment were assigned times to keep surveillance on the garden. A particularly effective way to reduce vandalism was to get the troublemakers involved in the garden.

In other communities that have established garden programs, side effects have been noted, such as improved maintenance of the neighborhood by residents, less litter, and fewer broken windows. Vacant lots are turned into neighborhood mini-parks where weddings and picnics are held. An Extension-sponsored program in Newark, New Jersey found that the community garden became the foundation for community development and proved to be a major factor contributing to community pride.

#### PLANTS AND HUMAN HEALTH

The most striking studies report health improvement due the proximity of plants that have important psychological, physiological and economic implications. A study by Roger Ulrich, Professor of Architecture, Texas A&M University, reported on the recovery of patients in a suburban Pennsylvania hospital; 23 cholecystectomy patients assigned to rooms with windows facing a natural scene had shorter postoperative hospital stays, received fewer negative evaluative comments in nurses' notes, and took fewer potent analgesics than did 23 matched patients in similar rooms with windows facing a brick wall.

Stephen Kaplan discussed a recently completed study at the Sloan-Kettering Institute in New York in which women recovering from breast cancer surgery found that walks in the garden helped restore their ability to concentrate and focus their attention, and it reduced their depression. At the start of the study, the scores of measured attention were so low they resembled those for brain-damaged patients. Over the next 90 days, some of the patients participated in specific activities (such as walking in the garden 20 to 30 minutes three times per week) which were selected to help restore them from the anxiety and mental fatigue related to the surgery. Those who participated in activities recover faster and were able to develop new interests. More of them went back to work during the initial 90 days and more went back to work full-time.



Plants may have equally strong implications for the mental and physical health of the general population. In a study of college students under stress from an exam conducted by Ulrich, views of plants increased positive feelings and reduced fear and anger. Other of his studies also documented physiological changes related to recovery from stress including lower blood pressure and reduced muscle tension. In unstressed individuals, he found that views of natural settings enhanced relaxation as indicated by increased alpha wave activity.

#### THEORIES TO EXPLAIN PEOPLE-PLANT INTERACTION

There are several theories to explain how and why being around plants can be so beneficial. The simplest theory, called arousal or overload, says that in the modern world we are constantly bombarded with so much noise, movement, and visual complexity that our surroundings can overwhelm our senses and lead to damaging levels of psychological and physiological excitement. Doesn't that pretty well describe your state of mind after 10 minutes of MTV? Plants, on the other hand, are less complex and have patterns that reduce arousal and therefore reduce our feelings of stress.

Another theory maintains that peoples' response to plants is a result of their early learning experiences or the culture in which they are raised. The concept here is that those individuals that grow up in West Texas will have a more positive attitude toward flat lands with sparse natural vegetation and cultivated crops such as sorghum and cotton than someone from the mountains of Virginia. Along this same line, this theory could be used to explain why Americans seem to prefer foundation plantings in their front yards even though the style of architecture has changed and these plants are no longer needed to hide an unattractive foundation.

This theory also holds that modern Western cultures condition people to like nature and plants and to have negative feelings about cities. However, this theory does not take into account the similarities found between people from different geographic and cultural backgrounds, or even those from different historic periods.

The desire for plants in our surroundings can be traced back to the ancient Egyptians and the walled gardens of Persian settlements in Mesopotamia. In the 1st century B.C., the Roman poet Horace wrote regarding city dweller: "...amid your varied columns you are nursing trees, and you praise the mansion which looks out on distant fields."

The final theory maintains that our response to plants is a result of evolution; that is, since we evolved with plants in our environment we have a psychological as well as physical dependency on them. This psychological dependency is seen as an unlearned



tendency to pay attention and respond positively to certain combinations of plants and other natural elements such as water and stone. The most positive types of response researchers have found have been to the settings that resemble those that would have been most favorable to survival in early humans. For example, one researcher has linked preference for certain tree forms to a high probability of finding food and water near similarly shaped trees in nature. Another researcher has shown that many features that we particularly enjoy in the modern landscape, such as a pathway that gently curves into the woods, were important to early man in terms of safety and exploration.

#### CONCLUSION

Researchers are beginning to document the intrinsic value of plants in our immediate surroundings. As stronger evidence accrues regarding the psychological, physiological, social and economic values contributed by plants in urban settings the use of plants by the general public as well as on public and private grounds should continue to increase.

Comments directed to the participants in the symposium The Role of Horticulture in Human Well Being and Social Development.

Through research, we offer America's horticulturists new ways to produce quality products efficiently and to expand their markets. We are moving into the future and, through your efforts, are broadening the entire vision of what horticulture can and should be. Charles Hess, Assistant Secretary, USDA.

The increased urbanization of humanity in the twentieth century has obscured the intimate connection between humans and plant life. This relationship has been neglected at great peril for our well-being as a species. The new role of horticulture will be to re-establish the bond between plants and people. Jules Janick, Professor of Horticulture, Purdue University, Past President, ASHS.

Although findings regarding most issues are limited, research has demonstrated that visual contacts with vegetation can have a number of positive influences on well-being and health. An especially important beneficial effect is the fostering of recovery from stress. Most research to date pertains to large vegetation such a trees; comparatively little work has examined passive contacts with small plants and flowers. Progress in understanding the human benefits of plants or flowers will require a greater number of studies that investigate physiological and health-related influences. To the extent that future research using these methods contributes tangible, credible evidence of the role of plants in human well-being and health, horticulture will be given higher priority in health related programs, environmental design and planning, and public allocation decisions. Roger Ulrich, Dean, College of Architecture, Texas A&M and Russ Parsons, Research Associate, Texas A&M.

Senior citizens represent the fastest growing segment of the American population. The demand for services for the elderly has increased dramatically in relation to housing, leisure activities and long term care. As a result, retirement communities in the U.S. are proliferating at a rapid rate. Many of these communities have substantially landscaped grounds and outdoor amenities, however, most have yet to be assessed as to whether these landscaped settings have a positive impact on the residents. In fact, our current general knowledge about the impact that the out-of-doors have on the aged related to well-being is extremely limited. Charlene Browne, Landscape Architecture, Virginia Tech University.

Like the wealthy patrons of the past, corporations are the modern-day Medici who are building establishments which improve the work place and provide benefits to the community and the corporation. In the area of horticulture, this is demonstrated be

well-developed grounds, public access, and the attitude that gardens and well-groomed park-like settings enhance the corporate image. Dana Parker, Longwood Graduate Program.

In community settings, such as public housing, low income residential neighborhoods, and schools, gardening is an effective technique for improving personal, social, and physical environments. Examples from low income areas of New York, Philadelphia, and Chicago are shown to provide human benefits and the satisfactions of enhanced self-esteem, increased sociability, reduction in vandalism, cleaner streets, painted buildings, and revitalized neighborhoods. The evidence is primarily anecdotal; therefore, gardening is not as universally accepted and utilized for social and community development as its benefits might warrant. To convince governmental bodies of its value will require research findings which clearly document the effectiveness of plants and planting activities in producing social and economic benefits. Charles Lewis, Research Fellow in Horticulture, Morton Arboretum, Chicago.

The benefits afforded by nearby nature can come from direct involvement with the plants or by opportunities to view them. In fact, even the knowledge that such settings are available in itself can be a source of great satisfaction. Given the extensive benefits afforded by nearby natural settings they must be considered a far more urgent priority than the word "amenity" would imply. Many residential settings provide minimal access to plants and natural areas. The working setting also is frequently devoid of plant materials. Recognizing the importance of undramatic, accessible, nearby nature is a first essential step in improving the health and effectiveness of many people both at home and at work. Rachel Kaplan, Professor of Environmental Psychology, University of Michigan and Stephen Kaplan, Professor of Psychology, University of Michigan.

Research on the role of horticulture in human well-being and social development can have application among diverse groups, and must, by its nature, be interdisciplinary. Research teams composed of horticulturists, psychologists, sociologists, geographers, botanists, planners, and other related professionals will play an important role in the future. Another important aspect of developing such research is establishing a network or consortium to ensure that the findings will be applicable and distributed to a wide range of users. Important groups in that network include researchers, communicators, suppliers of horticulture products and services, government and social service agencies, as well as trade and professional associations in horticulture, human services, human resources, marketing, and other fields. Diane Relf, Associate Professor, Department of Horticulture, Virginia Tech University.



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**FINANCE OUTLOOK: GUARDED OPTIMISM**

James Ryan, Diane Bertelsen, and Kenneth Erickson  
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The outlook is for limited growth in an otherwise healthy farm economy in 1991, as the impacts of recent developments here and abroad work through the farm sector. While most farm income measures attained record levels in 1990, factors coming into play late in the year indicate that U.S. farmers are likely to see slightly lower net incomes in 1991.

Cash receipts for crops are expected to increase in 1991, while steady livestock receipts are anticipated. Reduced direct Government payments and higher production expenses will overshadow the rise in cash receipts, resulting in net cash income below the record 1990 level. Net farm income is also expected to decline. Net farm income measures the value of agricultural production, plus direct Government payments, less all cash and noncash costs.

These income forecasts, coupled with other projected financial performance measures, point toward a slowing in the rate of growth of the farm economy. Equity growth is expected to slow in 1991, as land values are forecast to rise by a modest 2 to 4 percent. Farm borrowing is not expected to increase significantly as a result of a slight drop in income. Farm debt decreased by almost \$60 billion during the last half of the 1980's. Today's farm sector is not saddled with the debt servicing requirements that compounded the effects of income declines in the early 1980's.

**Factors Influencing 1991 Farm Economy**

The economic performance of the farm sector will continue to be affected by the U.S. economy and international developments. High global food grain levels dampen wheat prices and limit trade. Favorable weather throughout the Northern Hemisphere resulted in a 10-percent rise in world wheat production in 1990. Near record yields on greater harvested acreage increased U.S. production by 35 percent. In the U.S., stocks are rising and prices falling as former importers of U.S. wheat utilize their own domestic production.

Recent tensions in the Persian Gulf will contribute to higher fuel, fertilizer, and chemical prices for farmers in 1991. Wheat acreages are expected to decline 10 to 12 percent, but increased planted acres of other program commodities will contribute to higher production expenses. While energy markets are expected to stabilize by year-end 1991, the short-term



downward pressure on economic growth rates for most developed economies could further reduce the demand for U.S. farm exports.

Domestic demand growth will partly depend on the performance of the U.S. economy. Forecasts of general economic conditions suggest that real domestic GNP growth will be slow through the end of 1991.

The bulk of direct Government payments to farmers in 1991 result from 1990 farm programs. The Food, Agriculture, Conservation, and Trade Act (FACT) of 1990, in conforming to provisions of the Omnibus Budget Reconciliation Act, is expected to lower direct Government payments. Less participation in commodity programs, lower advance deficiency payment rates, and the triple base provision contribute to the projected reduction in direct payments in 1991.

#### Beyond 1991: FACT and GATT

Beyond responding to these short-run commodity and input market developments, the farm economy must anticipate a changing policy environment emerging under the new Farm Bill and GATT negotiations. Under FACT, farmers can expect lower Government payments in the future, as the sector contributes within the context of the federal budget deficit reduction package. However, farm program participants will have greater freedom in cropping choices on their 15-percent triple base acres and optional additional 10-percent "flex" acres.

Successful resolution of the GATT negotiations will ultimately mean lower barriers to trade, and greater access to international markets. However, current unresolved agricultural issues in the GATT talks reduce the likelihood of a trade agreement by the scheduled December 7 conclusion. In the long run, U.S. farmers are expected to benefit from more intense competition in less restricted foreign markets. However, the gains from trade will not reach producers of currently highly protected commodities.

U.S. farmers may reap future short term income gains if the GATT negotiations fail to yield an agreement by June 30, 1992. The 'snap-back' provisions of FACT provide for additional farm program support if an agreement has not been reached. All planned spending cuts for agriculture will be waived if an agreement has not been reached by June 30, 1993. These provisions are designed to ensure that the U.S. does not unilaterally reduce barriers.

#### Cash Receipts Could Surpass \$170 Billion

The record levels of crop and livestock sales anticipated in 1991 could increase cash receipts from 1 to 4 percent over 1990, boosting total sales to between \$170 and \$175 billion. Strong annual sales growth has been a driving force in the farm sector recovery since 1987. During this period, livestock receipts have maintained a relatively stable 52 to 54 percent of total sales; this relationship is projected to continue in 1991.

Record sales are forecast for 1991 despite stable to slightly declining farm commodity prices. Even though drifting downward, these prices remain favorable relative to recent historical levels. The overall price index for

all farm products is currently expected to dip about 5 percent next year, with both crop and livestock prices showing the same relative declines. However, output of farm products is projected to grow 1 percent in 1991, on top of a 3- to 4-percent gain this year. Crops harvested in 1990 are likely to show a 5-percent gain over 1989, while livestock production is anticipated to grow 1 percent.

#### Cattle and Hogs: Strong Receipts Through 1991

Livestock receipts are expected to match 1990's record level of \$91 billion. Cattle prices are forecast to remain strong, averaging in the mid-\$70's. With production increasing less than 2 percent, cash receipts for cattle and calves are likely to be up about 3 percent in 1991. Hog prices are expected to decline slightly, 3 to 4 percent below 1990's average price. Hog receipts are anticipated to hold firm in 1991, as the price decline is offset by 3- to 4-percent more marketings.

Poultry sales are likely to be up 10 to 15 percent next year. Prices for broilers and turkeys are projected to average about the same as this year, with production gaining 5 to 6 percent. Cash receipts for dairy products are expected to drop 10 percent next year, as production growth puts downward pressure on milk prices. Dairy receipts increased about 10 percent in 1989, and another 10-percent gain is anticipated for 1990.

#### Record Crop Sales

Total crop receipts may exceed \$80 billion in 1991, up \$1 to \$5 billion from the 1990 forecast. Pushed by low stocks and pulled by a strong livestock sector, feed grain sales could increase as much as \$3 billion. Corn receipts are likely to be up 10 percent, while soybean receipts are expected to rise above \$11 billion. Growth in fruit and vegetable marketings at stable prices in 1991 will mean higher sales.

- o Corn production is expected to increase, if acreage reduction requirements decrease from 1990's 10 percent level. Some producers may opt not to participate in the Government program this year, expanding their planted acreage, and increasing their future base.
- o Soybean prices, anticipated to be stable in 1991, could be dampened by large expected plantings on triple base acres.

As 1990 began, wheat appeared to be one of the strongest crop commodities. Low stockpiles had encouraged an increase in wheat program acres from 90 percent to 95 percent of base. Farmers were given an option of planting up to 105 percent of base to increase supplies. In 1990, harvested acres increased by 12 percent and yields rose by over 20 percent, resulting in a 35 percent increase in total production.

- o Wheat prices fell throughout 1990, as the anticipated bumper crop was brought to harvest. Wheat receipts in 1990 are expected to drop 5 to 10 percent, as the price decline has more than offset the rise in

production. Sales of wheat in 1991 are forecast down as much as \$2 billion, with planted acreages declining and stocks holding the market price below the 1990 average.

#### Direct Government Payments Drop

Direct payments to farmers are forecast to fall by 10 to 15 percent in 1991, with the reduction due mainly to the initial impact of FACT. Total payments, however, are largely derived from 1990 program participation and market conditions, so, to an extent, the decrease continues the post-financial crisis trend of lower Government payment contributions to farm income.

Government payments to farmers, including net Commodity Credit Corporation outlays, accounted for 10 percent of gross cash income in 1987. That proportion has dropped annually in the intervening recovery years. In 1990, Government payments are forecast to be about 5 percent of gross cash income.

- o FACT is anticipated to reduce Government payments to farmers by \$700 to \$900 million in 1991. Most of this reduction is due to triple base acreage ineligibility for advance deficiency payments. The lowering of anticipated deficiency payments is expected to reduce program participation rates slightly.

#### Manufactured Inputs Lead Farm Expense Rise

The \$1 to \$6 billion increase in gross cash income in 1991 will be accompanied by a \$2 to \$8 billion rise in cash expenses. The most noticeable farm cost increases can be attributed to the August oil price shock, which raised the 1990 fuel price index 10 to 15 percent over 1989. Despite forecasts of lower oil prices by the end of 1991, the fuel price index is anticipated to rise another 8 to 12 percent for the year. Prices of most production items are expected to drift upward, with the exception of feed and feeder livestock.

Total expenses are forecast to rise \$4 to \$9 billion in 1991. This 3- to 6-percent annual increase follows a 2-percent gain in 1990. Feed and feeder livestock expenditures are expected to increase less than 2 percent.

Oil- and energy-related manufactured inputs expenses are projected to show the greatest increase, adding \$1 to \$3 billion to total expenses. Farmer expenditures for manufactured inputs are likely to increase by 9 to 10 percent in 1991.

Interest expense is expected to remain between \$14 to \$15 billion, as debt levels stabilize and interest rates flatten. During the high debt and interest rate periods of the early 1980's, interest expenses were almost 16 percent of all production expenses. In 1991, interest expenses are forecast to be less than 10 percent of production expenditures.

## Net Income Squeezed by Rising Expenses

Gross cash income, which includes cash receipts, government payments, and farm-related income, is forecast to increase 1 to 3 percent in 1991. Farmers will feel a slight cost squeeze, as, with expenses rising more than incomes, net cash income is likely to drop 2 to 3 percent. With non-cash income and expense items accounted for, net farm income is projected to be down about 5 percent from 1990.

This decline in net farm income is not expected to signal the beginning of a new era of farm financial stress. While lower cash income means less progress, farmers have reduced debt levels and restructured their balance sheets in recent years. Individual farmers with high debt loads will be most sensitive to lower net income. However, most farmers are not likely to experience the major debt repayment problems that characterized the mid-80's.

## Net Income Remains Relatively High

Despite the decline forecast for 1991, net cash income and net farm income remain near record levels. When adjusted for inflation, both measures appear to be returning to the levels they maintained throughout the 1960's. While total real net income is at these historical norms, the number of U.S. farms has decreased by 35 percent. This suggests that U.S. farm income is earned by fewer farms.

## Farm Asset Growth Negligible

The value of U.S. farm assets (excluding operator households) rose \$24 billion during 1990, an increase of about 3 percent. Total assets are forecast to rise to \$825 to \$835 billion in 1991, as the rate of growth slows to less than 2 percent. These changes are relatively modest compared with recent years, which may reflect a stabilizing agricultural economy. The real value of farm assets is projected to decline in 1990 and in 1991, as the general rate of inflation is anticipated to exceed the growth in asset values.

Total farm real estate assets increased slightly less than \$18 billion during 1990. This 3-percent rise in total farmland value suggests that record cash income levels did not dramatically increase investors' expectations of long-run profitability of farming. Current farmers also showed limited desire to bid up land prices in attempting to expand operations. The projected income dip in 1991 should result in an even more modest land value appreciation rate of 2 to 4 percent this year.

Nonreal estate asset values are forecast to rise by about \$5 billion in 1991, led by relatively stable prices for slightly rising livestock inventories. The value of machinery on farms and financial assets are also projected to register slight nominal increases in 1991, while inventory values of crops and purchased inputs are not expected to change.



## Farm Debt Stable

Total farm debt is projected to increase only slightly during 1991. An increase would end a 7-year run of annual debt reductions. Due to the combined effects of strengthening land values and improving repayment capacity of farm borrowers, lenders are becoming less concerned with loan defaults arising from land value declines. Simultaneously, farmers are more willing and better able to incur debt to purchase land and replace machinery and equipment.

- o With debt levels generally lower than in the early 1980's, farmers appear to be in a better financial position to withstand 1991's projected income dip. When income fell during the early 1980's, farmers had substantially higher debt servicing needs.

The traditional institutional farm lenders, the Farm Credit System (FCS) and commercial banks, are restoring loan portfolio quality by recruitment of selected borrowers. Commercial bank lending should rise by nearly \$2 billion in 1991, as banks report adequate credit availability for qualified borrowers. Farm Credit System nonreal estate lending is projected to increase during 1991, while FCS real estate debt stabilizes.

## Farm Lender Shares Change

Even though total farm business debt is forecast to increase slightly during 1991, the loan portfolios of individual lenders may change dramatically. The decrease in debt held by Farmers Home Administration (FmHA) should be more than offset by increased loan volumes of other farm credit sources.

- o As FmHA continues to resolve its problem loan portfolio, FmHA farm debt could fall by another \$2 to \$3 billion in 1991. On June 30, 1990, almost half of FmHA debt was owed by delinquent borrowers. Principal and interest payments delinquent more than 4 years totalled over \$5 billion.

In recent years, banks have gained market share through aggressive pursuit of limited risk, high quality mid- to large-scale farming operations. In the process, banks have lured away many of the Farm Credit System's most desirable borrowers. As FCS restructuring and recovery continues, the System is becoming more aggressive in regaining market share.

- o Commercial banks are expected to hold almost 36 percent of all farm debt by the end of 1991, while the Farm Credit System's share is anticipated to be less than 28 percent. This represents a reversal of 1984 market shares of these two lenders.

Life insurance company debt is projected to rise about 5 percent in 1991, as other real estate assets appear less desirable. Most of the increased lending activity will occur in the West and Southeast.

### Farm Equity Growth Slight

Farm equity is expected to be about \$700 billion by the end of 1991, with growth for the year slowing to about 2 percent. For 1990, equity is estimated to increase almost 4 percent. With these growth rates lagging the general inflation rate, real (\$1982) farm equity will decline slightly each year.

- o The nominal farm equity increase projected for 1991 will mark the fifth consecutive year of equity growth. From a peak of \$816 billion in 1980, farm equity declined over \$280 billion by the end of 1986. About 60 percent of that equity 'loss' will have been 'recovered' by year-end 1991.

### Farm Sector Returns

Relatively high rates of return to farm equity and assets are expected to continue through 1991. The rate of return on equity from current income is expected to be 3 to 4 percent in 1991. Rates of return on equity and on assets are projected to continue the relatively favorable levels of recent years.

Other measures of financial performance reflect the anticipated slowing of the recovery process. While 1991 cash income should allow adequate funds for debt servicing, the aggregate farm debt-to-asset ratio continues to improve. Returns to operators, a residual income measure for farm businesses, is expected to fall slightly.

### Lender Loan Losses Decline

To a large extent, farm lenders were reluctant partners in the resolution of the financial crisis of the 1980's. Farm business debt has fallen from \$193 billion at the beginning of 1984 to an estimated \$134 billion at year-end 1990, a drop of almost \$60 billion. Over \$21 billion of this decline can be attributed to loan charge-offs taken by lenders during this period. The recovery of the late 1980's is also reflected in loan loss rates, as losses for all lenders other than FmHA have declined substantially. The improved quality of most lenders loan portfolios suggests that farm creditors will be better able to deal with those farmers most affected by the anticipated income drop in 1991.

Specialized agricultural creditors appear to have been more adversely affected by these losses than lenders with more diversified portfolios.

- o Estimated commercial bank loan losses totalled over \$5 billion during 1984-90. While these losses contributed to the rural bank failure rate, total bank farm debt increased by almost \$1 billion during this period. Banks are expected to report net recoveries (negative losses) in both 1990 and 1991.
- o Farm Credit System losses were almost \$4 billion during 1984-90. However, FCS loans outstanding dropped almost \$28 billion, a decline of

43 percent. The System reported net recoveries in 1989. Recovery of past losses is expected to continue through 1991.

Together, these observations suggest that more FCS borrowers may have been lured away by other lenders (principally banks) than were subjected to collection action by the FCS. Loan pricing policies had facilitated the rapid expansion of the System during the late 1970's and early 1980's. As interest rates fell at mid-decade, bank loan rates became more attractive, and many farmers shifted from the FCS to their local banks. As lower risk borrowers changed lenders, the reduction in the average quality of its loan portfolio contributed to the financial difficulties of the FCS. The competitive nature of agricultural lending may have increased FCS exposure in the farm financial crisis.

- o Farmers Home Administration losses have increased dramatically in recent years, as FmHA has begun to account for losses that had effectively occurred in the early 1980's. By the end of 1991, FmHA losses (of principal and interest) may approach \$11 billion, with write-offs totalling almost \$8 billion during 1989-91.

#### Conclusions: Guarded Optimism for 1991 and Beyond

The U.S farm economy enters 1991 with reason to be cautiously optimistic. The expected record level commodity receipts assumes a relatively strong demand for farm products. Livestock producers should benefit from anticipated differentials between livestock and feed prices. Crop supplies will need to be monitored carefully. As 1990 wheat markets have shown, commodity stock levels can change dramatically with one production season.

All is not positive for the sector in 1991. Despite high cash receipts, the expected rise in farm expenses will mean less net income available to farmers. Even though the resulting net income squeeze is anticipated to be much less severe than that of the 1980's, farmers can expect to make less financial progress in 1991 than they have experienced in recent years. While it appears that farmers will not make great financial strides in 1991, most will be able to avoid major set-backs.

Overall, the financial position of farmers entering 1991 appears to be stronger than at any time since the late 1970's. This is largely due to cautious investment behavior, effective cost control, increased cash financing, and continued reduction of outstanding debt. The combined effect of gradually increasing asset values and reduced debt loads have greatly lowered farmers' vulnerability to short-term fluctuations in income.

While the health of the farm economy through the early 1990's is not a certainty, farmers and their lenders appear to be incorporating some hard finance lessons learned in the mid-1980s. Both are now reluctant to respond to the relatively high income levels of recent years with renewed debt-financed expansion. Farmers are applying this same cost-consciousness to variable input usage. Higher prices for most purchased inputs, at least in the near term, will require application of even more effective cost control

measures. Through the globalization of agriculture in the 1990's, politically resolved trade issues may significantly change economic relationships, creating conditions that can be expected to greatly affect the sector's financial performance.

#### (1) FARM FINANCE OUTLOOK 1991

- o CROP & LIVESTOCK RECEIPTS
- o PRODUCTION EXPENDITURES
- o NET INCOME
- o BALANCE SHEET CHANGES
- o FINANCIAL PERFORMANCE

#### (2) THE FARM ECONOMY IN 1991

SHORT-RUN ECONOMIC PERFORMANCE WILL BE INFLUENCED BY:

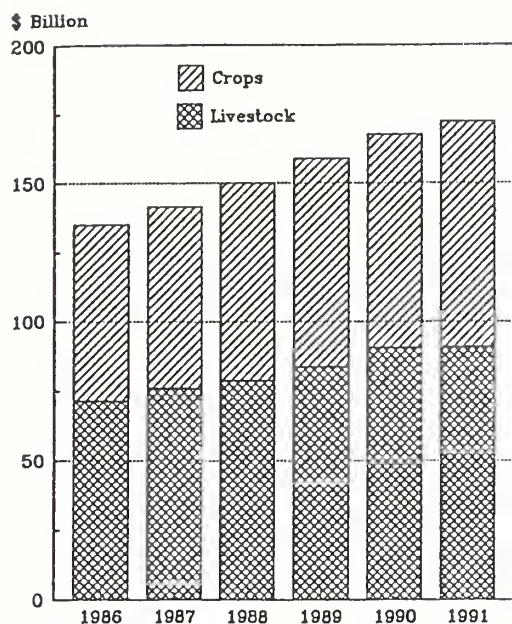
- o GLOBAL COMMODITY LEVELS
- o ENERGY MARKET STABILITY
- o GENERAL ECONOMIC CONDITIONS
- o FARM BILL IMPACT

#### (3) THE FARM ECONOMY BEYOND 1991

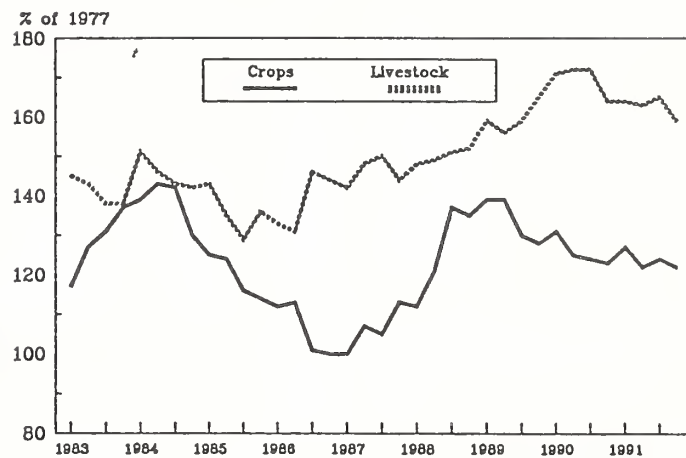
- o FARM BILL IMPACT
  - REDUCED GOVERNMENT PAYMENT
  - GREATER PRODUCER FLEXIBILITY
- o GATT NEGOTIATIONS
  - REDUCED BARRIERS TO TRADE
  - REDUCED INTERNATIONAL SUPPORT OF AGRICULTURE
  - LOWER DOMESTIC SUPPORT



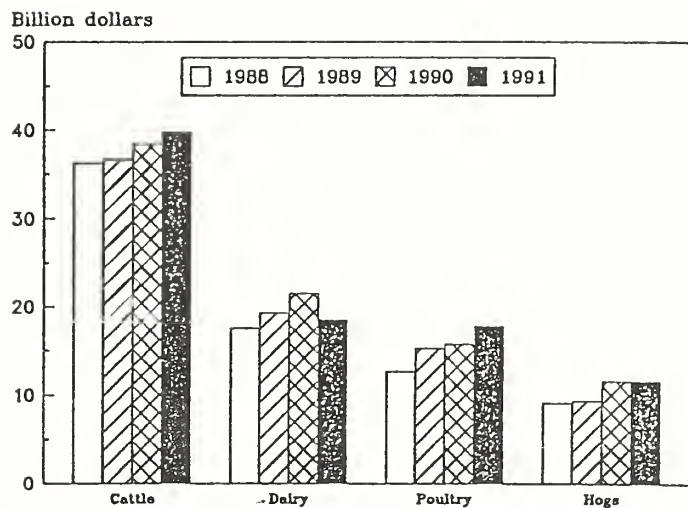
(4) Cash Receipts



(5) Prices Received by Farmers

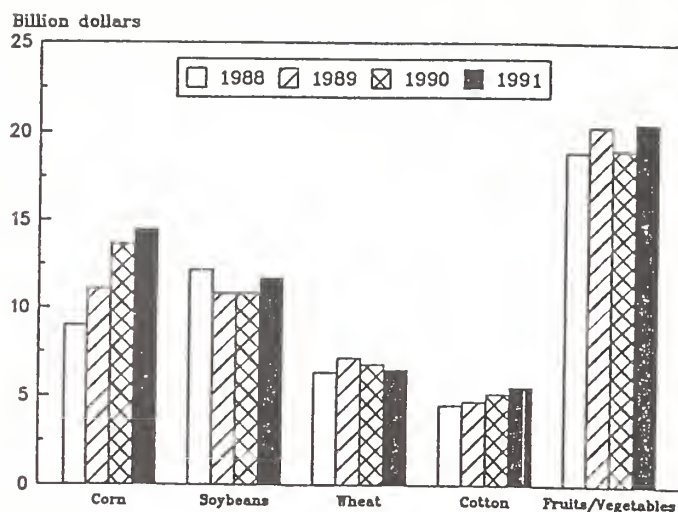


(6) Livestock Receipts



(7)

## Crop Receipts



## (8) Direct Government Payments

Year	Billion dollars
1987	16.7
1988	14.5
1989	10.9
1990	9.4
1991F	8-9

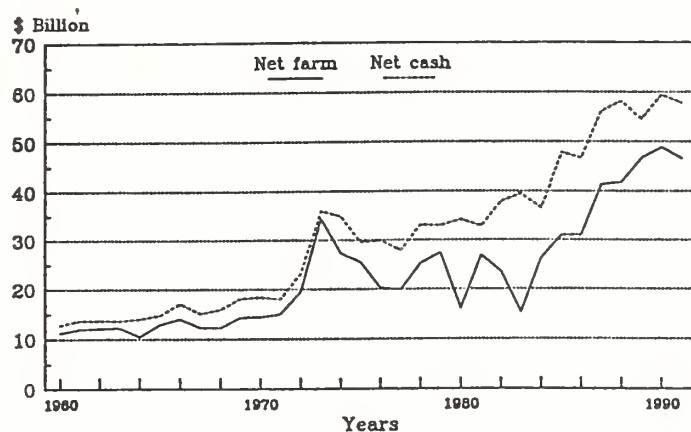
## (9) Total expenditures up about 5 percent

	1988	1989	1990	1991
	Billion dollars			
Total	132	143	145	149-154
Feed, seed, calves	37	39	40	40
Fertilizer, chemicals, fuel	18	21	21	23
Interest	15	15	14	15
Depreciation, taxes, rent	29	31	32	33

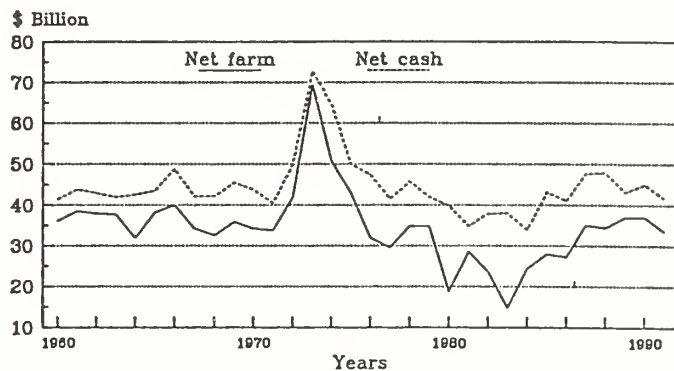
## (10) Farm income and expense measures

	1988	1989	1990	1991
	Billion dollar			
Gross cash income	170	178	184	185-190
Cash expenses	112	123	125	127-133
Net cash income	58	55	59	55-60
Non cash income	4	12	10	8-12
Non cash expense	20	20	20	20-22
Net farm income	42	47	49	44-49

(11) Net farm and net cash income, 1960-1991  
current dollars

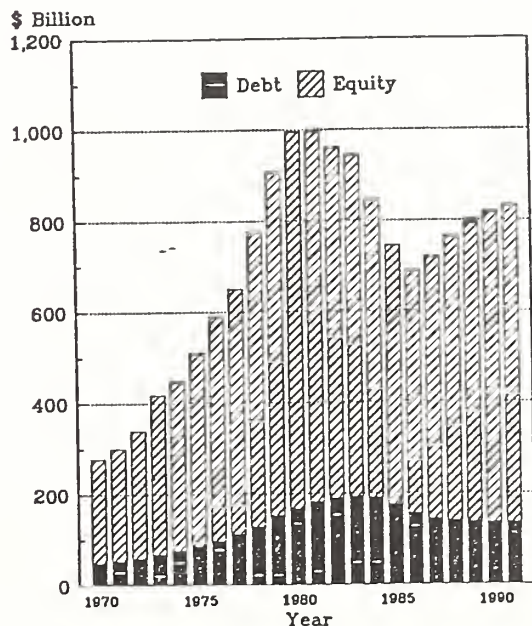


(12) Net farm and net cash income, 1960-1991  
real dollars



Note: Deflated by the GNP Implicit Price Deflator (1982=100)

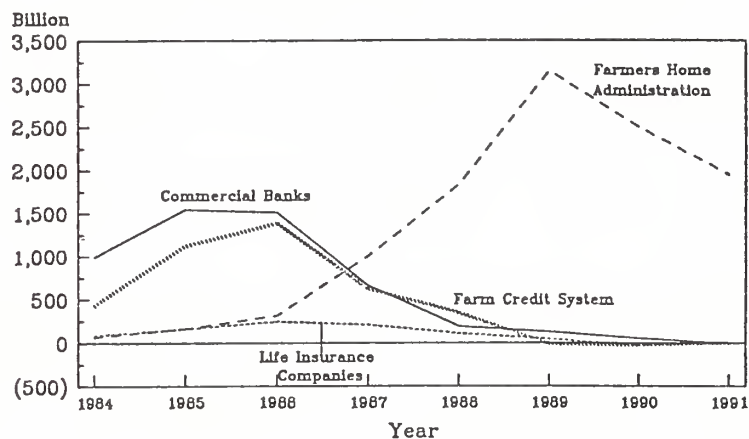
(13) Farm Debt and Equity



(14) Farm balance sheet in 1991 shows slight improvement in nominal terms, slight decline in real terms

	1987	1988	1989	1990	1991
	<u>Billion dollars</u>				
<u>Current dollars</u>					
Assets	719	764	794	818	825-835
Debt	142	138	136	134	133-137
Equity	577	626	658	684	693-705
<u>Deflated dollars (1982)</u>					
Assets	611	628	628	617	590-600
Debt	122	116	109	103	100-105
Equity	490	514	520	516	500-510

(15) Annual Lender Loan Losses



(16) 1991 BOTTOM LINE: GUARDED OPTIMISM FOR FARM ECONOMY

- o RECORD COMMODITY RECEIPTS
- o CONTINUED STRONG LIVESTOCK PROFITS
- o INCREASING CROP STOCKPILES
- o RISING FARM EXPENSES
- o MODERATE NET INCOME SQUEEZE
- o LESS FINANCIAL PROGRESS IN 1991



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## OUTLOOK FOR FARM INPUTS

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The outlook for farm inputs consumption and expenditure in 1991 will be heavily influenced by the recent rise in energy prices and an expected increase in row crop acreage next year. Farmers are expected to spend between \$127 and \$133 billion in 1991 for agricultural inputs, representing a 3-6 percent increase from the estimated 1990 level (figure 1). Even if 1991 planted acreage remains near 1990 levels, higher manufactured input prices will push aggregate input expenses above 1990 levels. Much of the farm expenditure increase in 1991 is related directly or indirectly to the anticipated rise in energy prices throughout the economy. In addition, expenditures will also rise if more input intensive crop acreage is planted in 1991, compared to 1990.

Agricultural inputs is a diverse topic encompassing land, seeds, fertilizers, pesticides, farm machinery, repairs, feeds, labor, credit, livestock, animal health products, energy, water, farm structures, trucks, and a host of other goods and services purchased by farmers. This presentation will focus on the situation and outlook for planted acreage, seeds, and the major manufactured agricultural inputs. Information on feed and livestock inputs is being presented in other Outlook sessions. In closing I'll briefly review several of the trends and issues affecting agricultural inputs in the near and long term.

The largest category (28 percent) of agricultural production expenses have a farm origin and include expenditures for livestock, feed, and seed. Expenditures for these inputs are largely influenced by livestock and grain prices. Overhead expenses (depreciation, taxes, and rent) make up about 22 percent of all production costs, and by definition, are not directly linked to agricultural production levels. However, historically most of the remaining expense categories are correlated with acreage planted and farm output. Operating expenses including repairs, machine hire, and marketing costs (16 percent); interest (12 percent); and labor (8 percent) are other major production cost categories. Manufactured inputs (fertilizer, pesticides and energy) account for 14 percent of all production expenses. The distribution of production expenses across major categories has remained fairly constant during the last several years, but we expect to see some changes in the near

Input use on crops is highly dependent on the mix and level of crop acres planted. Per acre seeding rates, application rates for fertilizer and pesticides, and tillage practices tend to change slowly from year-to-year leaving acres planted the major determinant of aggregate consumption.

Planted acreage of the principal row and solid-seeded crops peaked in 1981, fell dramatically in the PIK-year of 1983, bounced back in 1984 and declined through 1988<sup>1</sup>. During 1989 and 1990, planted acreage was 3-5 percent above 1988 levels. Much of the planted acreage variation in the 1980's was due to the input intensive row crops (figure 2). The less extensively farmed solid seeded (i.e. small grains) crop acreage (which is dominated by winter wheat acreage) declined between 1982 and 1988 but increased 6 million acres between 1988 and 1990. Planted acreage of the principal crops in 1990 was about 328 million acres.

Even if total 1991 planted acreage remains unchanged from 1990 levels, the mix of crop is likely to shift due to different ARP levels and increased flexibility of farm programs. There is likely to be an increase in row crop acreage and a decrease in solid seeded crops, especially winter wheat due to a higher wheat ARP.

### Seed Consumption

In 1990, seed consumption of the eight major field crops was close to 6.3 million tons, down 13 percent from the record acreage year of 1981 when 7.2 million tons were planted (figure 3). Corn and soybean seeding rates were up in 1990 as soil moisture conditions returned to normal, while cotton seeding rates were slightly lower than 1989 rates. Winter wheat seeding rates in 1990 were also slightly below 1989 levels (table 1). For 1991, seed use will likely fall about 4-6 percent over 1990 due to an expected decline in winter wheat acreage.

The combination of greater planted acreage, reduced seed supply, increased commodity prices and more expensive off-season production led to some significant seed price increases in 1989. Forage seed prices also rose in 1989 as Conservation Reserve Program (CRP) acres continued to increase. However, in 1990 seed supplies returned to normal levels while commodity prices fell from drought-induced levels of 1988 and 1989. Hence, 1990 seed costs per acre for corn, wheat, cotton and soybeans were below those in 1989. USDA's prices paid index for seeds in 1990 was similar to the previous year and is likely to remain flat in 1991 if aggregate planted acreage declines and commodity prices weaken as expected (figure 4). Seed prices for non-hybrid crops tend to follow commercial crop prices.

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<sup>1</sup>Principal row crops include planted area of corn, sorghum, soybeans, flaxseed, peanuts, sunflowers, cotton, dry edible beans, potatoes, sweet potatoes, and sugarbeets, and harvested area of tobacco and sugarcane. Principal solid seeded crops include planted area of oats, barley, durum and other spring wheat, rice, winter wheat, and rye. All hay area is for harvested acreage only.

## Fertilizer Consumption

Fertilizer nutrient consumption stood at 19.6 million tons for the 1989 fertilizer year, only slightly less than the estimated 1990 consumption of about 19.9 million tons (figure 5). Fertilizer use in 1991 should be near 20 million tons, if row crop acreage expands sufficiently to offset the decline in small grains acreage.

Our 1990 application rate survey indicates that the share of acres treated with N, P or K were below or the same as 1989, but application rates were slightly higher for corn, soybeans and cotton (table 2). However, on wheat acreage both the share of acres treated and application rates were below 1989 levels. In the case of corn, the major consumer of fertilizer nutrients, application rates for nitrogen, phosphate and potash were 1-3 pounds above 1990 levels. More normal soil moisture conditions in the Cornbelt likely had a positive affect on fertilizer application rates.

Fertilizer prices declined sharply in 1990 as anticipated increases in planted acreage did not materialize and fertilizer stocks became burdensome. Despite modest decreases in demand projected for 1991, prices will likely be 5-7 percent above 1990 levels, due to the recent surge in energy prices (figure 6). Fertilizer prices since 1984 were well below the peak use years of 1981 and 1982 due to falling demand and lower energy costs. The sharp rise in energy prices during the latter half of this year signals a return to the nominal price levels experienced in 1981 and 1982.

## Pesticide Use

Estimates for pesticide use on the 10 major field crops also closely follow planted acreage with herbicides accounting for an estimated 80 percent of all active ingredients, insecticides about 15 percent, and fungicides and other compounds the remainder.<sup>2</sup> The herbicide market for the major crops of corn, cotton and soybeans is very mature with over 90 percent of the corn, soybean, and cotton acreages treated with herbicides, since the late 1970's. In recent years, over 95 percent of the corn and soybeans acres were treated with herbicides.

Consumption of pesticides on the major field crops is estimated at around 450-500 million pounds of active ingredients (a.i.) with year-to-year variations due to shifts in planted acreage and pest infestations (figure 7). Since corn, soybeans, wheat and cotton account for the largest portion of pesticide use, changes in these crop acres will significantly affect aggregate pesticide use. With wheat acreage down significantly and corn, soybean, and cotton acreage anticipated to increase slightly next year, pesticide consumption is expected to increase 2-4 percent from 1990 levels. As new products, which require very small amounts of a.i. per acre, are more widely adopted, aggregate pesticide poundage may actually decline even through acres treated remain stable or even increase.

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<sup>2</sup>The 10 major field crops are wheat, barley, oats, rice, corn, cotton, grain sorghum, peanuts, soybeans, and tobacco.



Pesticides prices, as measured by USDA's prices paid index for agricultural chemicals, trended downward between 1984 and 1987 but the trend has reversed with the index increasing 10 percent between 1988 and 1990 (figure 8). Despite fewer planted acres in 1991 pesticide prices will likely increase 2 to 4 percent as petroleum feedstock price increases are reflected in pesticide prices paid by farmers.

### Capital Purchases

Capital expenditures by farmers between 1980 and 1986 fell by nearly 60 percent. Rising real interest rates, declining commodity prices, curtailed agricultural exports, reluctance to take on additional debt, falling land values, reduced planted cropland, and the binge of capital spending in the 1970's led to very conservative levels of capital spending in the 1980's.

Tractors and other farm machinery typically make up about 60 percent of all capital expenditures with buildings and land improvements accounting for about 25-30 percent and cars and trucks accounting for the remaining 10-15 percent. Large new tractor purchases have been one of the hardest hit categories with unit sales off 75 percent between 1980 and 1986, but have recovered since then (figure 9).

Following 1986, the seven year slump for the farm machinery industry ended. Unit sales of new farm tractors and other large pieces of farm equipment increased in 1987, 1988 and 1989, and are likely to show further gains in 1990. Sales of new over 40 hp tractors may reach 63-65 thousand units in 1990, up from nearly 60 thousand units in 1989.

Since July of this year monthly unit sales of tractors and combines have fallen below year earlier levels (figure 10). While we continue to expect unit sales in 1990 to exceed those of 1989, our outlook for 1991 has become more conservative. Unit sales for 1991 are currently projected to be near 1990 levels, given that unit sales have shown distinct weakness since July. Furthermore, the outlook is for declining net farm income (including direct government payments) and reduced planted acreage in 1991. Also, some uncertainty regarding the impact of the 1990 Farm Bill may influence investment behavior. On the positive side, interest rates are projected to remain near 1990 year-end levels, cash marketings will likely increase and the debt/asset ratio for the sector is expected to remain near 1989-90 levels.

### Petroleum Products

Consumption of petroleum products by agricultural producers has been steadily declining since 1982 regardless of planted acreage levels (figure 11). While acres planted obviously influence energy use, other factors are also important. The switch from gasoline to diesel engines, reduced tillage operations, larger multi-function machines, and innovations in crop drying and irrigation have contributed to the decline in fuel consumption. While no-till farming has not been widely adopted, reduced tillage systems are now as prevalent as conventional tillage systems (i.e., including the use of a moldboard plow) in many parts of the country. With only a modest change in



planted acreage forecast for 1991, energy use will likely remain near the forecast levels for 1990. Although rapid petroleum price increases tend to encourage energy conservation in the long-run, short-run adjustments in energy consumption are often difficult due to the fixed nature of the machinery stock on farms.

Petroleum prices dropped almost continuously between 1982 and 1986 (figure 12). Since 1986, crude oil prices were relatively stable through the middle of this year. The Middle-East situation has spawned significant price increases throughout the last few months. It is clear that crude oil prices dictate the price farmer's pay for diesel fuel. As of November 1990 DOE was forecasting 1991 crude oil and diesel fuel prices to increase 30-40 percent, but unpredictable geopolitical forces will shape the final 1991 petroleum price structure. Since agriculture directly consumes only 3-4 percent of all energy used in the U.S., changes in the farm sector's usage will have little impact on petroleum prices.

If the world price of crude oil averages \$30 per barrel next year, compared with the earlier expectation of \$21, then farm energy expenses for diesel fuel, gasoline, liquified petroleum gas, and electricity will likely rise by 10 to 15 percent. A crude oil average price of \$40 per barrel would increase farm energy expenses around one-fourth. In addition, the increase in the motor fuels tax (applicable to both diesel fuel and gasoline) as a result of the Budget Reconciliation Act, will increase farm energy expenditures by 1.5 percent.

#### Trends and Issues Shaping Agricultural Input Consumption and Production

- Resolution of the Middle-East crisis has both short and long term implications for agriculture. Petroleum price increases and availability are of immediate concern to farmers. During energy crises in the 1970's, energy prices not only rose rapidly but fuel availability was a problem in some parts of the country. The energy intensive input industries, such as fertilizers and pesticides were similarly affected. In the longer run, energy conservation and the adoption of energy-saving technology will again influence production practices, input use and capital expenditures.
- Major changes in the industrial organization of the farm machinery, fertilizer, agricultural, chemical, seed, and credit industries have occurred in the last five years. These input industries have become concentrated and have taken on an international flavor. Agricultural input companies headquartered in Western Europe, Japan, and North America dominate the global input markets.
- Biotechnology research in both the private and public sector holds promise to transform or replace conventional inputs. Just as the mechanical, chemical, and computer technologies of the past changed input type, mix and intensity, livestock and crop genetic manipulation can do the same in the future. The established seed and chemical industries as well as the newer biotech firms, appear poised to bring a number of genetically engineered products to the market in the next few years if consumer acceptance and farmer adoption are realized.

- Farm programs will continue to exert influence on acres planted, commodity prices, and farm income. The 1990 Food, Agriculture, Conservation and Trade Act continues many of the policies of the 1985 Food Security Act, such as the CRP and Conservation Compliance. New provisions in the 1990 Act are aimed at protecting agricultural water quality, wetlands and environmentally sensitive land as well as encourage the adoption of integrated farm management plans.
- Changes were recently made in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) regarding pesticide testing or retesting for possible health and environmental risks. These tests will be costly and can lead to higher pesticide prices. More changes are being proposed for both FIFRA and the Federal Food, Drug and Cosmetic Act (FFDCA). Pesticide availability and use also can be affected by such issues as patent extension, groundwater contamination, liability issues, farm worker safety, and residues on food. The implementation of the Endangered Species Act may also influence pesticide usage patterns.
- Groundwater issues potentially will infringe upon the fertilizer industry especially in areas where nitrates have been detected in drinking water. A number of states have passed or proposed legislation aimed at protecting the drinking water of its citizens. The 1987 Water Quality Act promotes the concept of "best management practices" as a way of maximizing the benefit from using fertilizers yet minimizing the environmental side-effects on surface and ground water. Additionally some states have imposed or are considering taxes on fertilizer use. In the near terms tax considerations are not expected to affect fertilizer use in the aggregate.
- While the ongoing GATT negotiations are currently emphasizing agricultural commodity issues, these talks have implications for agricultural inputs. Worldwide shifts in agricultural production in response to changing trade patterns will affect the current mix, intensity, and location of input consumption and resource use. Furthermore, the current round of negotiations will also consider proprietary rights; an issue with implications for technology development and transfer for biotechnology, seeds, pesticides, and other R&D intensive inputs.
- Sustainable agriculture is currently an important issue within parts of the agricultural research community. Primarily in response to water quality and food safety problems, new technology development as well as reevaluation of traditional production practices are being encouraged. The substitution of land, labor or management for conventional inputs such as fertilizer and pesticides and the further adoption of reduced tillage systems and crop rotations are proposed as ways to reduce costs of production. At the very least this program should alert farmers to the possible environmental and economic consequences of input use. While sustainable agriculture and the reduction of chemical input use has received considerable publicity, short term use of fertilizer and pesticides are not projected to be affected. Longer term effects are dependent upon the success of new technology as well as other factors such input and output prices, input substitutability, government programs, output mix, and possibly regulations.

Figure 1 Farm Expenses

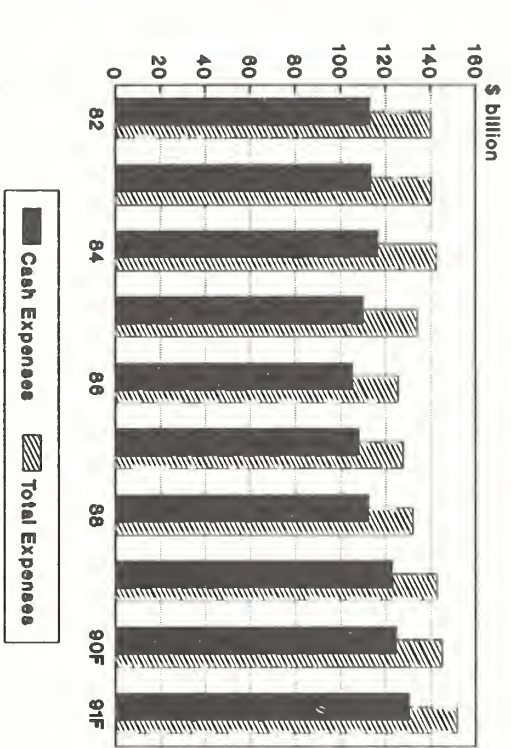


Figure 2 Area Planted to Principal Crops

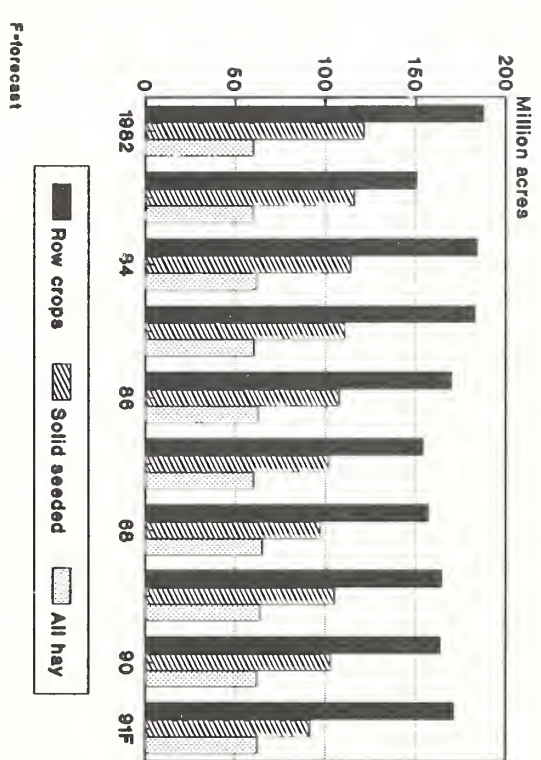


Figure 3 Seed Use for Major Crops

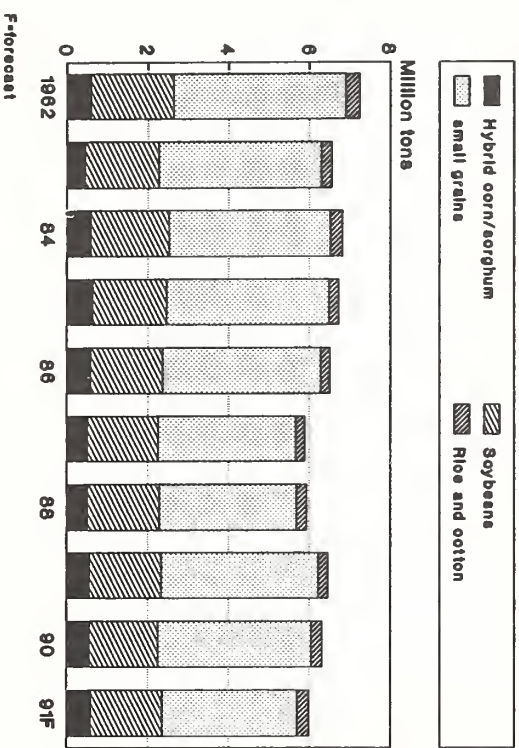


Figure 4 Seed Price Index

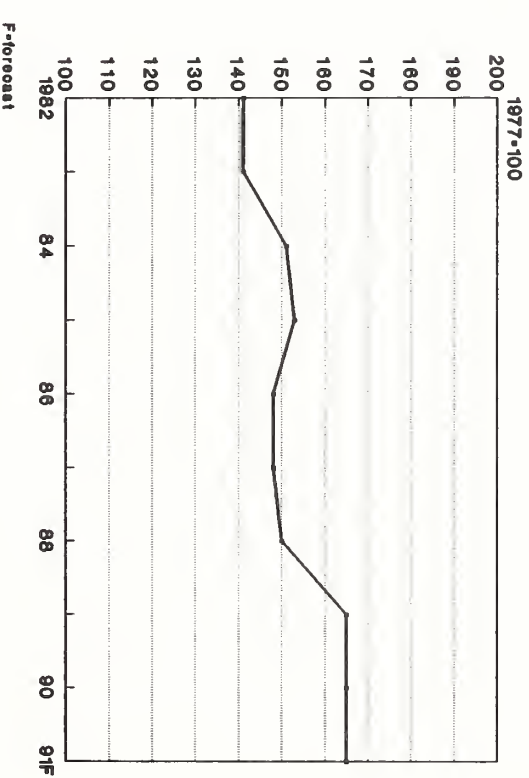




Figure 5 Fertilizer Nutrient Consumption

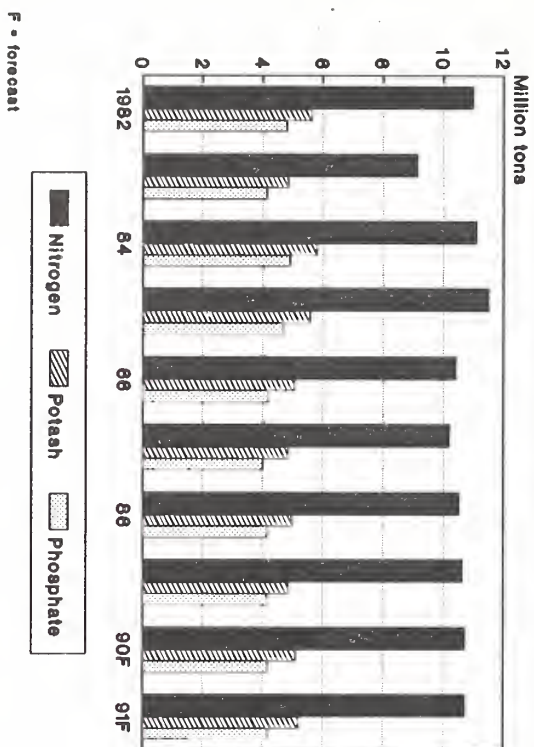


Figure 6

Fertilizer Price Index

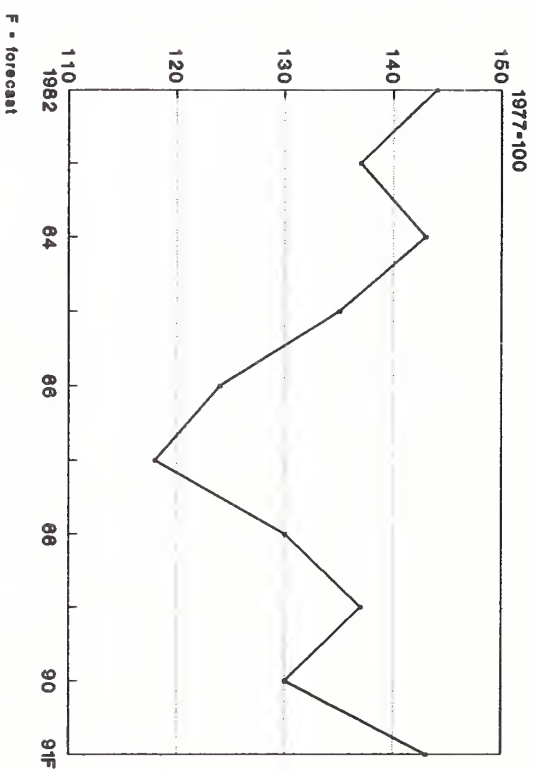


Figure 7  
Estimated Pesticide Use  
on Major Field Crops

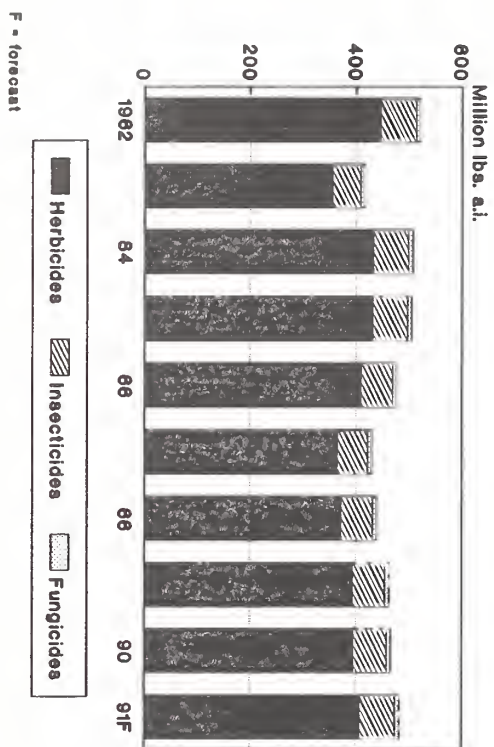


Figure 8

Agricultural Chemical Price Index

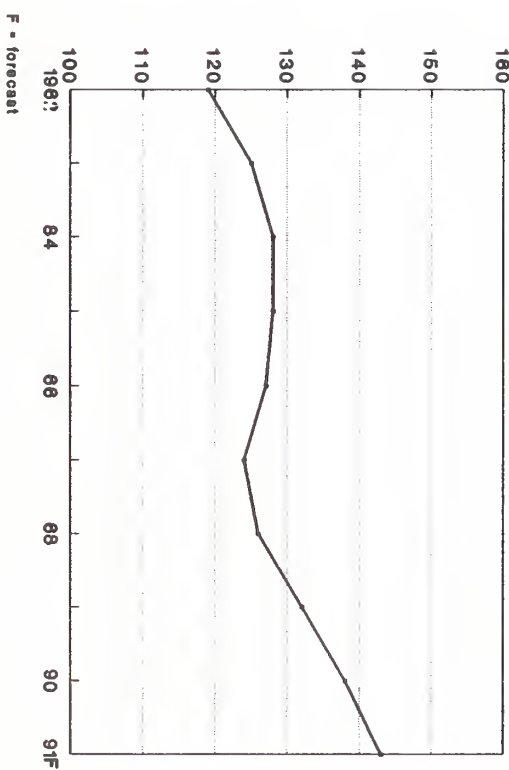




Figure 9 Tractor Unit Sales

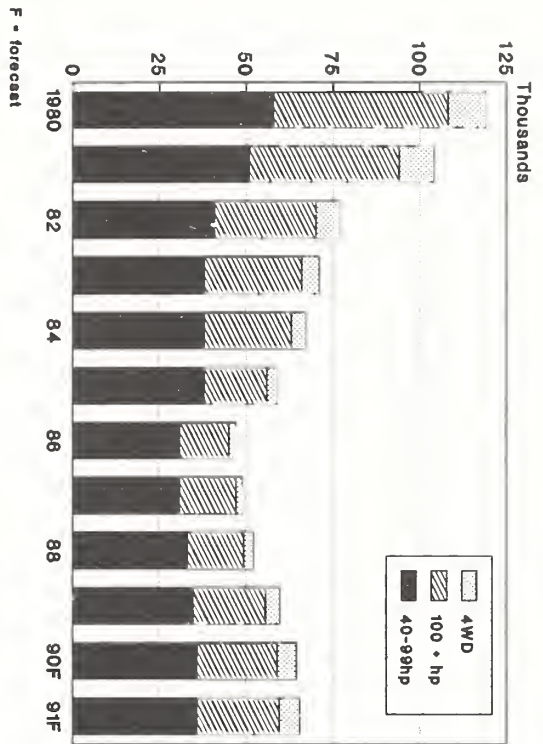


Figure 10 Sales of Self-Propelled Combines

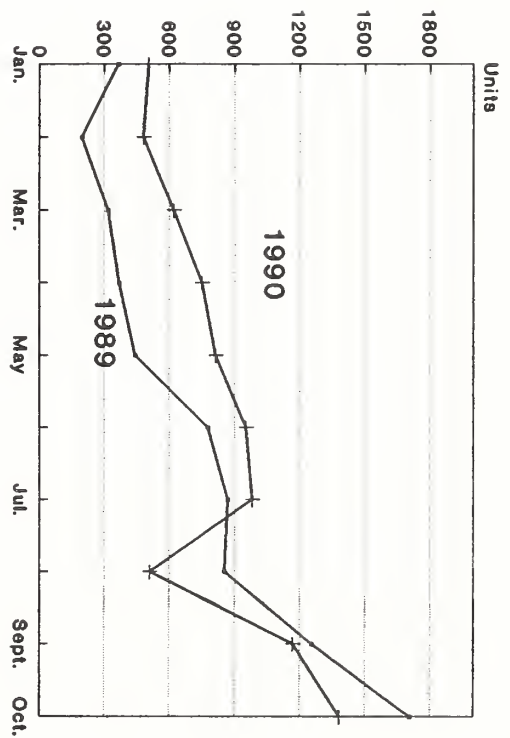


Figure 11 Farm Fuel Use

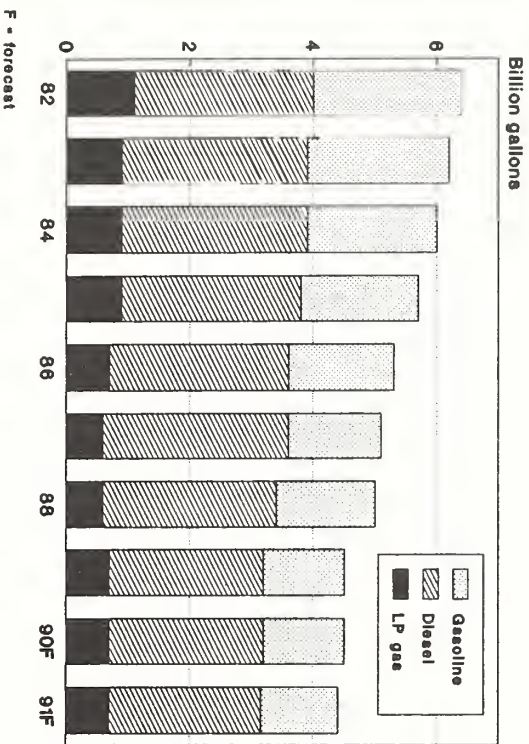


Figure 12 Crude Oil and Diesel Fuel Prices

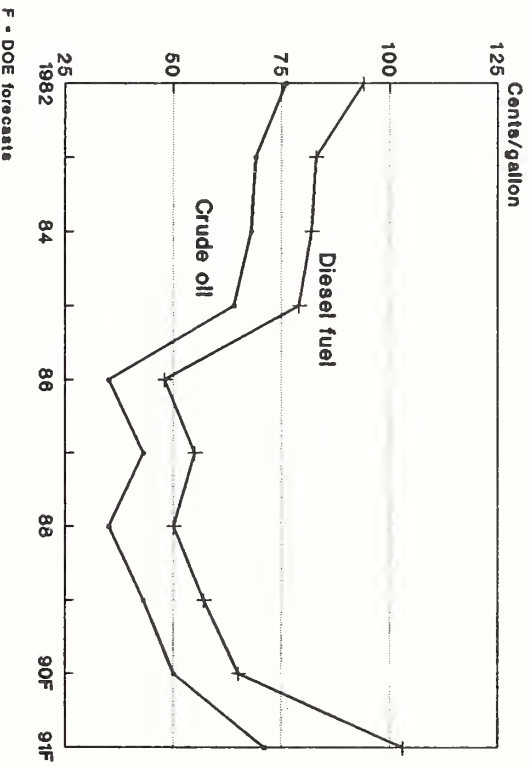


Table 1--Seeding rate and cost for selected crops in major producing States, 1990 (Preliminary)

Crop/ State	Acres planted	Per acre		:	Crop/ State	Acres Planted	Per acre	
		Rates	Cost				Rates	Cost
Soybeans	Thous.	Pounds	Dollars	:	Corn for grain	Thous.	Kernels	Dollars
AR	3,100	56	11.30	:	IL	10,700	25,300	20.90
GA	900	48	10.40	:	IN	5,600	24,800	20.40
IL	9,200	66	16.00	:	IA	12,800	25,200	21.00
IN	4,300	64	14.70	:	MI	2,400	24,300	20.40
IA	8,000	59	15.50	:	MN	6,700	25,900	22.20
KY	1,250	61	12.10	:	MO	2,100	21,900	18.90
LA	1,800	53	14.90	:	NE	7,700	24,600	20.20
MN	4,600	65	13.10	:	D1 A/	2,400	17,900	15.30
MS	2,100	53	9.90	:	D2 B/	5,300	27,500	22.40
MO	4,200	61	13.60	:	OH	3,700	26,200	22.30
NE	2,400	59	14.30	:	SD	3,400	18,500	15.50
NC	1,400	58	12.10	:	WI	3,700	24,700	18.50
OH	3,700	78	16.40	:				
TN	1,300	54	10.30	:	Area	66,500	24,700	20.50
Area	48,250	62	14.20	:				
Cotton				:	Spring Wheat		Pounds	
AZ	340	16	9.30	:	MN	2,800	107	10.80
AR	760	13	7.40	:	MT	2,800	64	5.90
CA	1,050	16	11.20	:	ND	8,000	88	7.80
LA	780	12	7.30	:	SD	2,200	92	9.00
MS	1,200	12	7.60	:	Area	15,800	88	8.40
TX	5,600	19	6.90	:				
Area	9,730	17	7.80	:	Durum Wheat			
Rice				:	ND	3,100	97	7.50
AR	1,230	125	19.90	:				
LA	570	129	22.50	:				
Area	1,800	126	20.80	:				

This table and the succeeding tables contain preliminary 1990 information. Final tables on seed, fertilizer, pesticide and tillage use during 1990 and additional data will be published in "Agricultural Resources--Inputs Situation and Outlook Report" to be issued in February, 1991.

A/ Non-irrigated.

B/ Irrigated

Table 2--Fertilizer use on selected crops in the major producing States, 1990 (preliminary)

1997															
		Acres receiving			Application rate					Acres receiving			Application rate		
State	Acres 1/	N	P2O5	K2O	N	P2O5	K2O	State	Acres 1/	N	P2O5	K2O	N	P2O5	K2O
Thousand		Percent			Pounds per acre			Thousand		Percent			Pounds per acre		
Corn for grain								Cotton							
IL	10,700	100	91	89	164	81	107	AZ	340	94	47	8	155	68	21
IN	5,600	100	96	89	139	75	111	AR	760	99	83	87	85	36	57
IA	12,800	96	82	80	127	58	74	CA	1,050	94	31	3	140	68	40
MI	2,400	96	90	94	123	52	95	LA	780	99	62	62	77	48	62
MN	6,700	98	90	86	113	51	69	MS	1,200	99	42	56	109	50	78
MO	2,100	95	80	80	133	58	80	TX	5,600	66	48	20	59	40	17
NE	7,700	98	68	34	144	31	22	6 State							
D1 3/	2,400	94	48	30	96	31	22	Total	9,730	79	49	31	86	44	47
D2 4/	5,300	99	78	36	164	32	22								
OH	3,700	99	94	89	151	72	101	All wheat 2/							
SD	3,400	77	58	33	80	42	24								
WI	3,700	100	96	95	79	52	74	AR	1,300	100	31	31	100	41	55
10 State								CO	2,550	64	18	nr	41	22	nr
Total	66,500	97	85	77	132	60	84	IL	1,950	100	90	79	85	74	91
Soybeans								KS	11,800	88	44	9	49	29	21
AR	3,100	13	24	26	38	53	67	MN	2,800	97	87	70	83	42	34
GA	900	58	72	73	19	40	69	MO	2,000	96	78	83	84	51	71
IL	9,200	16	27	34	25	58	96	MT	5,400	63	59	14	44	29	14
IN	4,300	22	33	44	16	41	90	NE	2,250	79	22	*	50	27	*
IA	8,000	10	11	14	34	40	56	ND	11,100	66	60	16	42	30	12
KY	1,250	36	49	46	40	72	84	OH	1,350	97	95	90	75	66	70
LA	1,800	15	30	27	23	45	55	OK	6,300	91	62	10	65	34	25
MN	4,600	12	12	13	16	34	62	SD	3,900	51	36	5	39	27	7
MS	2,100	13	19	23	43	39	67	TX	4,200	66	35	5	88	37	10
MO	4,200	8	14	15	21	41	63	WA	2,200	98	33	*	65	19	*
NE	2,400	15	12	5	32	40	32	14 State							
NC	1,400	50	61	66	16	40	85	Total	59,100	79	52	19	59	36	44
OH	3,700	20	29	47	11	48	105								
TN	1,300	35	50	51	30	42	56	Rice							
14 State								AR	1230	97	15	18	114	47	57
Total	48,250	17	24	29	24	47	81	LA	570	99	81	79	115	45	45
								2 State							
								Total	1800	97	36	37	114	45	49

\* -- insufficient data    nr = none reported

1/ Acres are harvested for winter wheat and planted for all other crops.

2/ Does not include winter wheat in MN, ND and SD; spring wheat in CO and WA; and durum wheat in MN, MT, and SD.

3/ Non-irrigated.

4/ Irrigated.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91, Session C16

Wednesday, November 28, 1990

## Industry Perspective

John A. Stark  
Editor and Publisher  
Stark's Off-Highway Ledger

I am pleased and honored to be here with you today, to discuss our business outlook on the North American farm machinery industry.

Merely five months ago, farm machinery manufacturers had good reason to believe that 1991 would yield another solid year of rebound in the markets. Most farm-related indicators pointed to healthy economic performance next year. Business was expected to recover for the fourth straight year by another 3-4%.

However...as the first illustration indicates...farm economic indicators have taken a nosedive. Gross farm income is still expected to increase next year. But net farm income is seen off due to rising operating expenses, an adverse effect from sharply higher costs for fertilizers, chemicals and fuel.

The attitude overlay has turned decisively negative as farmers seek to avoid mistakes of the early 1980s by determining not to take on excessive debt. Debt normally is incurred by farmers as they mortgage assets to acquire new machinery.

Acreage plantings are likely to increase in 1991, but many farmers are expected to opt out of the government subsidy programs due to uncertainty. Commodity over-production should result in lower, not higher, prices.

Corn, wheat and soybean output is seen on the rise. But the development will be stalked by a lower price structure for the commodities.

A 2% increase in pork production, amidst the breeding of more young hogs, translates into lower pork prices. Coupled with rising operating expenses, lower demand for 40-99 hp two wheel drive farm tractors is in the cards.

A drop in cattle prices will likely come in the wake of a hike in the size of herds. It also means lower demand for tractors.

Despite a reduction in interest rates, other major economic indicators appear to be on the wane...such as car sales and housing starts.

Due to rising operating costs, the value of farm inventories and industrial goods will likely be pared in 1991, creating an unfavorable scenario for new machinery demand on farms.



Hence, a 2½ year rebound in the farm machinery business appears to have ended last August. As the second illustration indicates, business has entered the downturn of a new industry cycle...the length of which is uncertain.

Many vehicle manufacturers expect the downturn to last for at least one year. We agree. Farm machinery sales in the U.S. and Canada will likely decline by 7% in 1991, compared to 1990.

Since farm machinery production tends to trail the ups and downs of farm vehicle sales by three to six months (see third illustration,) cutbacks in farm tractor and self-propelled combine manufacture is fully expected by the 1991 first quarter.

Vehicle assembly is seen falling by 4½ % in 1991, despite a larger 7% contraction in demand for the self-propelled machines. It means that inventories of new but unsold vehicles will be rebuilt next year.

John Deere, for example, slashed local vehicle production schedules last October 31. But it also raised new tractor prices by 4½ % and combine prices by 6% the following day. J.I. Case, a chief competitor, maintained high vehicle manufacturing rates and froze prices on new machines through this January 1 in a bid to outmaneuver Deere.

Many industry officials remain concerned over a subsequent extraordinary buildup of new tractor inventories on dealer lots. If history repeats itself, steep vehicle price discounts will return in the 1991 first quarter as Case liquidates stocks of unsold vehicles.

It could spark a sticker price war in 1991!

Another factor is this. Most farm vehicles below 100 hp are imported from Europe and Japan. When local demand for the machines contracts, incentives will likely be used to spike vehicle exports to North America.









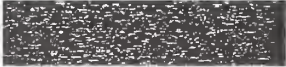





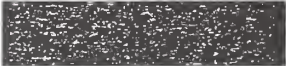
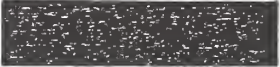

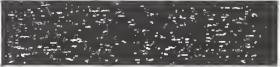






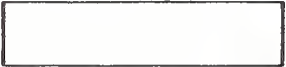

Due to the fact that 70% of farm tractors sold in the U.S. and Canada originate from overseas sources, low value of the U.S. dollar will surely create extraordinary pressure for producing firms to raise vehicle prices. But the use of competitive price incentives will cause them to absorb a major part of the price hikes...cutting sharply into profit margins.

An unmistakable trend of declining vehicle assembly and sales is cast for 1991. Corporate cash management will determine exactly how much local production capacity remains intact through the end of next year.

I have some thoughts on this topic and will be happy to respond on the subject in a question and answer session.

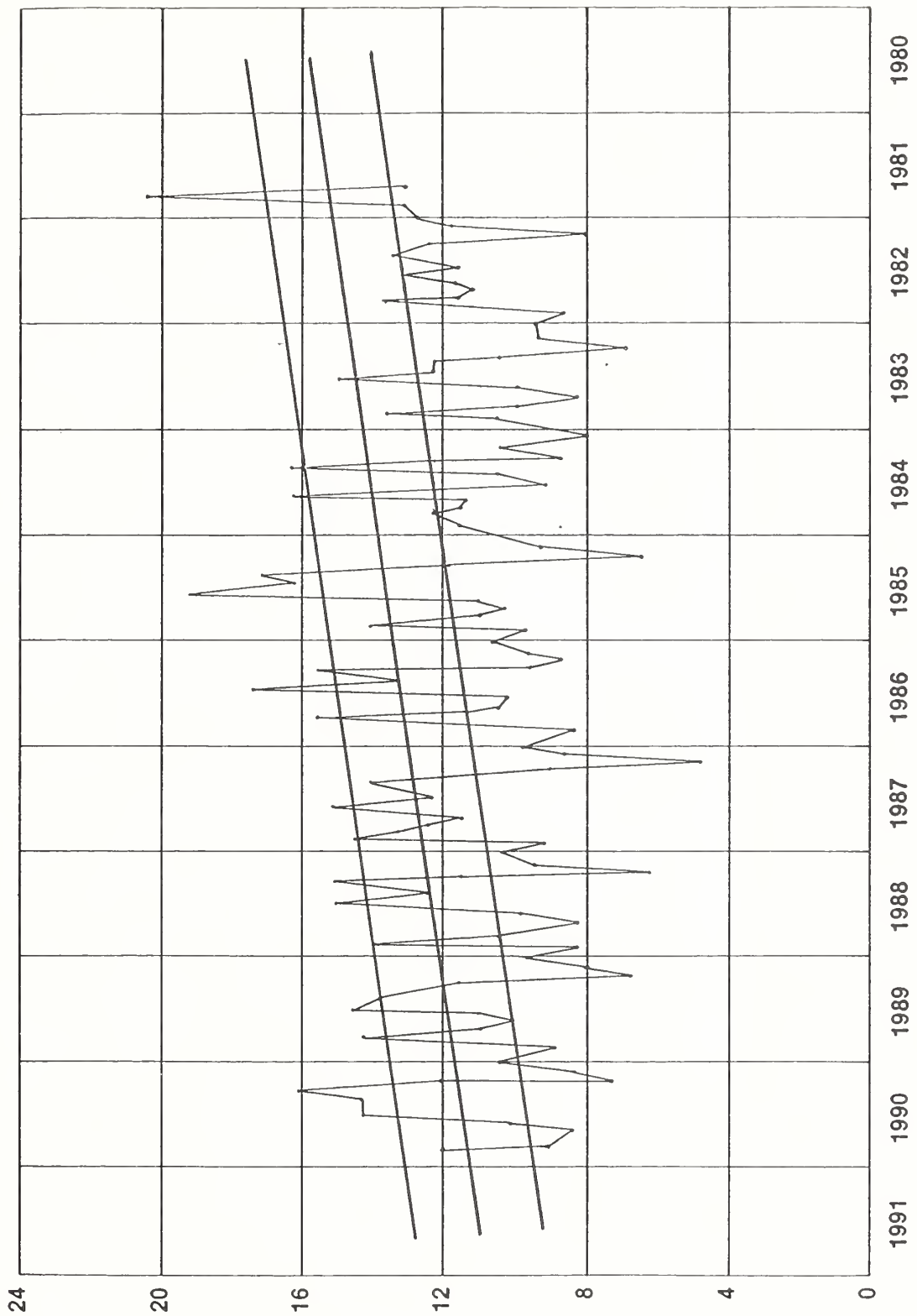
Please keep in mind that I'm not Albert Einstein!

# FARM MACHINERY ECONOMIC INDICATORS

	JUNE 90	NOV 90
GROSS FARM		
NET FARM		
ATTITUDES		
ACREAGE PLANTINGS		
AUTO SALES		
HOUSING STARTS		
INTEREST RATES		
CURRENCY EXCHANGE		
UNEMPLOYMENT		
COMMODITY PRICES		
CORN		
WHEAT		
SOYBEANS		
CATTLE PRICES		
OVERALL		

SOURCE: STARK'S OFF-HIGHWAY LEDGER

# NORTH AMERICAN FARM MACHINERY SALES



SOURCE: STARK'S OFF-HIGHWAY LEDGER

## NORTH AMERICAN FARM MACHINERY SALES OUTLOOK

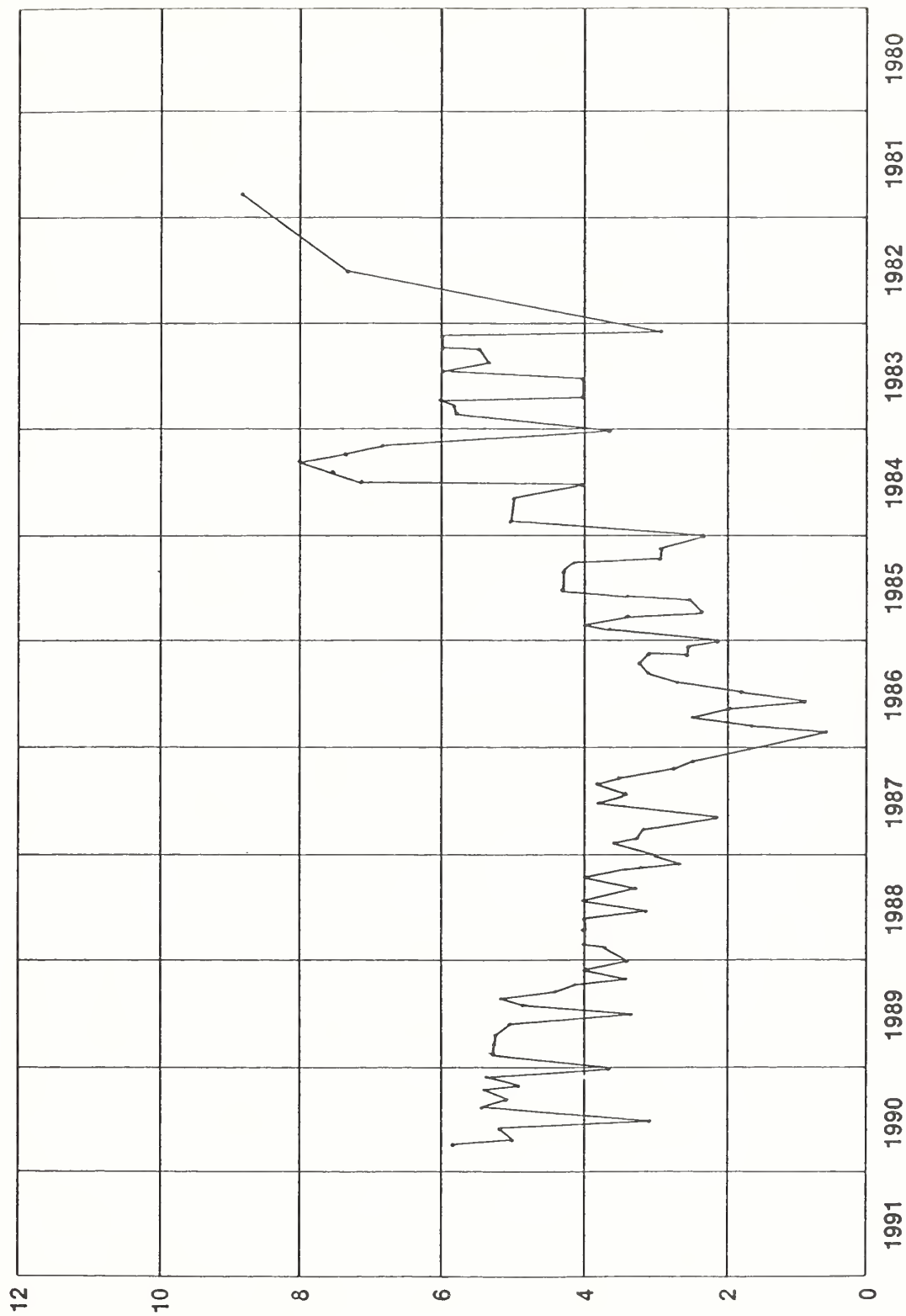
	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981
Below 40 hp	40,000	45,000	50,670	58,545	64,565	65,955	60,625	54,495	48,310	44,995	51,555
40 - 99 hp	44,000	48,000	42,800	42,435	39,865	41,230	46,265	46,935	44,925	49,675	61,815
100 hp & over	23,500	24,100	23,545	18,455	19,015	17,710	22,670	29,090	33,775	35,595	51,695
All 4WDs	7,000	7,000	5,605	4,070	2,635	3,645	5,580	6,325	7,555	9,975	14,050
Tot Tractors	114,500	124,100	122,620	123,505	126,080	127,540	135,140	136,845	134,565	140,240	179,115
Combines	11,600	11,500	10,745	7,190	8,715	10,480	11,260	14,220	15,680	19,750	31,890
Grand Total	126,100	135,600	133,365	130,695	143,795	138,020	146,400	151,065	150,245	159,990	211,005

Note: 1991 & 1990 data represent forecasts, subject to revision.

SOURCE: STARK'S OFF-HIGHWAY LEDGER



# NORTH AMERICAN FARM MACHINERY PRODUCTION



SOURCE: STARK'S OFF-HIGHWAY LEDGER

## NORTH AMERICAN FARM MACHINERY PRODUCTION OUTLOOK

	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980
John Deere	27,000	29,000	25,045	22,230	15,630	5,260	15,725	20,415	28,480	33,000	38,000	42,000
J.I. Case	17,500	18,300	16,515	12,945	9,925	9,200	7,125	17,315	18,010	21,900	25,350	29,500
Ford	4,300	4,200	4,115	3,455	5,590	10,430	14,285	20,775	21,720	23,450	25,400	30,300
White	3,000	2,900	3,000	1,830	2,575	1,475	345	2,335	1,250	3,000	4,000	4,500
Deutz-Allis	1,500	1,500	1,370	1,460	1,645	1,240	3,035	8,500	7,815	9,000	10,500	13,000
Caterpillar	500	450	585	465	385	—	—	—	—	—	—	—
Massey	—	—	—	—	1,390	750	1,675	2,050	1,620	2,000	5,000	7,000
Total	53,800	56,350	51,630	42,385	37,140	28,355	42,190	71,390	78,895	92,350	108,250	126,300

Note: 1991 & 1990 data represent forecasts, subject to revision. All data represents assembly of tractors & self-propelled combines in the U.S. & Canada. J.I. Case data pooled with Steiger, Ford data pooled with New Holland & Versatile to display true pattern of industrywide production trends.

SOURCE: STARK'S OFF-HIGHWAY LEDGER

## NORTH AMERICAN FARM MACHINERY INVENTORY OUTLOOK

	2WD Tractors	4WD Tractors	SP Combines	Total
December 1991	87,000	3,100	6,400	96,500
December 1990	83,000	3,000	6,000	92,000
December 1989	102,500	3,950	5,100	111,550
December 1988	103,500	3,690	6,150	113,340
December 1987	107,050	3,430	6,380	116,860
December 1986	109,200	2,760	4,905	121,770
December 1985	103,625	4,450	8,850	116,925
December 1984	114,205	6,710	11,863	132,780
December 1983	110,135	5,750	14,800	130,685
December 1982	99,900	5,200	12,900	118,000
December 1981	110,685	6,375	11,740	128,800
December 1980	95,680	7,030	10,635	113,345
December 1979	98,200	5,690	7,340	111,230
December 1978	78,680	3,975	8,100	90,755
December 1977	62,675	5,100	8,370	76,145
December 1976	53,000	3,900	4,670	61,570
December 1975	52,000	3,700	4,360	60,060

Note: 1991 & 1990 data represent forecasts, subject to revision. All data represents dealer stocks of tractors and self-propelled combines in the U.S. & Canada.

**SOURCE: STARK'S OFF-HIGHWAY LEDGER**



Outlook '91, Session #C16 For Release: Wednesday, November 28, 1990

CHANGES IN FARM STRUCTURE

Thomas A. Carlin and Donn A. Reimund  
Agricultural Economists  
Economic Research Service

Farm numbers will continue to decline in the 1990's, but at a slower rate than was experienced during much of the post World War II period. We estimate that by 1995, there will be about 3.5 percent fewer farms in the United States, and, by 2000, we expect the number of U.S. farms to be about 6 percent lower than the number of farms in the U.S. today (figure 1). This is substantially lower than the 11 percent decline experienced during the 1980's.

There will be more large farms at the turn of the century than there are today and production will be even more concentrated among our Nation's largest farms. These large farms will be a small component of the farm sector in terms of numbers and they will be well run and profitable businesses. While production will become more concentrated, the farm sector will still be relatively atomistic compared to nonfarm industries. There will also be a large number of small farms for which the vagaries of farm income will be almost inconsequential to the overall well-being of associated households. Indeed, if we peer below the surface, we can see that today's farm sector closely resembles our description for the year 2000.

Some Tenets Have Changed

ERS research reveals that some of our long held tenets about U.S. farming have changed. Today, shortrun economic conditions, largely beyond the farm gate, play a more important role in influencing farm numbers and structure as the U.S. farm sector is becoming increasingly integrated into the general economy of the Nation and the world. Prior to the mid 1970's, short run economic conditions also likely influenced farm numbers, but the effects were swamped by the secular adjustment that featured a large outmigration of labor from the sector, a steady decline in farm numbers, and increased farm size.



The large declines in farm numbers that occurred during the 1950's and 1960's were influenced by two major factors. The first was the greater productivity of labor and other farm inputs associated with mechanization, management and organizational innovations, and other changes in farming practices and technologies. The second was greater nonfarm wages relative to farm earnings associated with the growth of the U.S. economy. But, the pressure for labor to move out of agriculture seems to have abated. Farm household income levels are more in line with those in the nonfarm sector and the introduction of labor-saving farm technologies seems to have slowed also. This later view is supported by research findings that show that growth in farm productivity during the years 1948-68 was more rapid than during the more recent years. Labor productivity increased by over 11 percent annually from 1948-68, by 5.3 percent annually from 1968-78, and by 3 percent annually from 1978-88. Consequently, the rate of decline in farm numbers has slowed over time, and was even temporarily halted during the relatively prosperous years of the late 1970's, as was the increase in farm size.

The structure of the farm sector is ultimately the product of decisions of many individuals concerning whether to enter or leave farming or whether to expand or contract existing farms. ERS research reveals that the slowing of the net decline in farm numbers during the late 1970's resulted from the greater entry of new farmers. This was the result of several factors that seemed to converge during that time period. These included favorable rural economic growth during the late 1960's and early 1970's that influenced part-time farming, a large cohort of farm youth (from whom most farm entrants are drawn) born during the baby boom years of the 1950's who reached the age where career choices are typically made, a favorable farm economy driven by farm exports, and favorable tax treatment for farming. Research evidence indicates that the entry of new farms prior to 1982 was disproportionately among small farms which helps account for the decrease in average farm size that was observed during the late 1970's. The pattern did vary by region. Strong net entry was limited to Western and Eastern States and metropolitan areas, while the trend toward fewer and larger farms continued in many rural areas of the Midwest and Great Plains.

The 1980's farm recession had less effect on farm numbers and farm structure than it did on farm finances. The rate of decline in farm numbers increased somewhat during the mid 1980's but the rate of decline was nowhere near that experienced in the 1950's and early 1960's. Much attention was given in the media to the forced exits from farming through bankruptcy or involuntary liquidation. It is therefore often assumed that such forced exits are responsible for the greater decline in net farm numbers during the 1980's.

While there is no hard evidence about how many farms were forced out of

business during the farm crisis years, research conducted jointly by ERS and several universities suggests that only about half of those leaving during this period were due to financial stress. (Also keep in mind that we have no real evidence as to the number of farm businesses that could be expected to be in financial difficulties under generally favorable economic circumstances.) The remainder of the farms exiting were what we call "voluntary exits", and were most frequently associated with retirement.

The net decline in farm numbers during the 1980's is also associated with reduced entry. Our research shows that the rate of gross exits from farming continued almost unchanged during the 1970's and 1980's. However, analysis of 1987 Census of Agriculture data reveals a significant drop in entry during the mid-1980's as compared with 1978-82 when entry was unusually high.

As we enter the 1990's, we expect the rate of decline in farm numbers to slow once again. Given the age structure of current farm operators (relatively high proportion 55 and older; 21.5 percent), we expect the gross exit rate to continue probably unchanged into the 1990's. The key then is the rate of entry into the sector. Given the overall improvement in the financial conditions in the sector, we expect a slight increase in the gross entry rate of farm operators over the decade.

### Trends Vary by Region

Regional differences in changes in farm numbers and size have emerged in recent years (figure 2). When we examined trends in farm numbers and size for each of 5 U.S. regions, all regions showed rapidly decreasing farm numbers through the 1960's. But, in the 1970's farm numbers stabilized in the Northeast and actually increased in the West. In the South and the major farming regions of the Midwest and Plains, farm numbers continued to fall but at a slower rate. There were areas within the South and Plains regions where farm numbers stabilized or increased, but these situations were not sufficient to change the longer term trends within the regions.

#### Northeast and West

Much of the entry of new farms during the 1970's in the Northeast and West was by small part-time farms, leading to accompanying decreases in farms size. Entry in the Northeast was largely concentrated around metropolitan areas, while increases in the Western farm numbers occurred in conjunction with rural population growth in the region. Farm numbers

have fallen again in the Northeast during the 1980's largely because of farm consolidation and enlargement while they have stabilized in the West.

### Midwest and Plains

Farm numbers in most areas of the Midwest and Plains have continued to fall throughout the 1970's and 1980's and farm size has continued to increase. In the Midwest and Plains, where good farmland is relatively abundant, people and nonfarm job opportunities relatively scarce, and the topography lends itself to large farms, there is still pressure for farm expansion and consolidation. There was a curious increase in farm numbers in many counties in the Northern Plains States west of the Missouri River as reported by the Census Bureau for the period 1982-87. We have considerable reservation about whether this is a real increase in the number of jobs and people in farming. There also continues to be real farm number growth in eastern Texas counties which is likely associated in part, with increased recreation/retirement activity in these rural areas. In general, however, we see little prospect of a major reversal in the trends towards fewer and larger farms in the Midwest and Plains regions in 1990's.

### South

Farm losses were heavy in the South during the 1970's and 1980's, particularly in the Coastal Plains and Piedmont areas of the Southeast. The South has been a traditional small, part-time farming area for many years thus the economic strength of the Southern rural nonfarm economy is important for the staying power of the farm sector. While employment growth in the Southern nonmetro economy was fairly high during the 1980's relative to nonmetro areas in other regions, it paled in comparison to employment growth in the metro South. The South still has many poor people on farms, leading to pressure for continued farm-nonfarm migration, some of which might be affected by a simple occupational change rather than physical migration. The South, like the Midwest and Plains, still has many aging farm operators facing retirement, thus farm entry will be an important variable to watch during the 1990's.

### Factors Affecting Farm Structure in The 1990's

We tend to think of farming as a single industry but it is really composed of many distinctly different parts. In order to discern how the farm sector might change during the 1990's, we need to examine some of the component parts. For example, we expect the number of small non-commercial farms to continue decreasing as they have in recent years. We expect the number of large commercial farms, those that produce most of



the food and fiber to continue to increase in number as well as concentration of production much as they have during the last 15 years (figure 3).

#### Small Part-time Farms

Almost half our farm operators have a principal occupation other than farming; for what ever reason, farming is a second job. The increased importance of off-farm income to farm families has been the major structural change that has occurred over the last 15 years. Farms operated on a part-time basis tend to be small (as measured by sales and acres), use about 13 percent of commercial fertilizer, 12 percent of agricultural chemicals, and 15 percent of petroleum products. Small-scale cattle production is most frequently the primary enterprise on these farms. Part-time farms are disproportionately located in the South from Eastern Texas and Oklahoma through Southern Missouri, Southern interior uplands, Eastern mountains and valley areas and Southern Piedmont (figure 4). The key to their staying power is going to depend on the vitality of the rural nonfarm economy. While there has been an uptick in nonmetro employment growth relative to Metro areas since 1987, the rate of growth has slowed. How rural areas ride out the near term economic slowdown is critical to the staying power of part-time farmers.

#### Mid-size Farms

Small to moderate size commercial farms have suffered the largest percentage declines of all the farm size categories over the past two decades. This group of farms decreased by about 12.5 percent between 1982 and 1987 and accounted for about 40 percent of the total farm loss. About one-fifth of all U.S. farms were in this size category in 1987. They accounted for 17 percent of the value of farm production and 24 percent of the agricultural chemicals, 27 percent of petroleum products, and 26 percent of the commercial fertilizer purchased by farmers in 1987. These farms mainly produce cash grains and cattle. Operators of mid-size farms are under considerable financial pressure to either enlarge their farming operations to a more viable commercial size or to scale back to a smaller part-time size of operation. Consolidation of midsize farms into larger units has been a major source of the growth of large commercial farms over the two past decades. This farm consolidation is expected to continue, but at a somewhat slower pace in the 1990's.

#### Large Commercial Farms

We have witnessed a quiet "industrialization" of the farm sector over the last two decades. Large commercial farms have grown in number, they are producing a growing share of total production of food and fiber, and they



are generally profitable and healthy businesses (Figure 5). For example, in 1987, 50 percent of the market value of all agricultural products sold from farms was accounted for by just 75,700 farms, 3.6 percent of all U.S. farms. These 75,700 farms accounted for 29 percent of commercial fertilizer, 36 percent of the agricultural chemicals, and 27 percent of petroleum products purchased by farms during 1987. These large farms are more likely to specialize in the production of intensive high-value crops, poultry and cattle feeding. While the farm sector has become more concentrated in the last two decades, it is still atomistic relative to most other nonfarm industries. We see the concentration of production increasing throughout the 1990's.

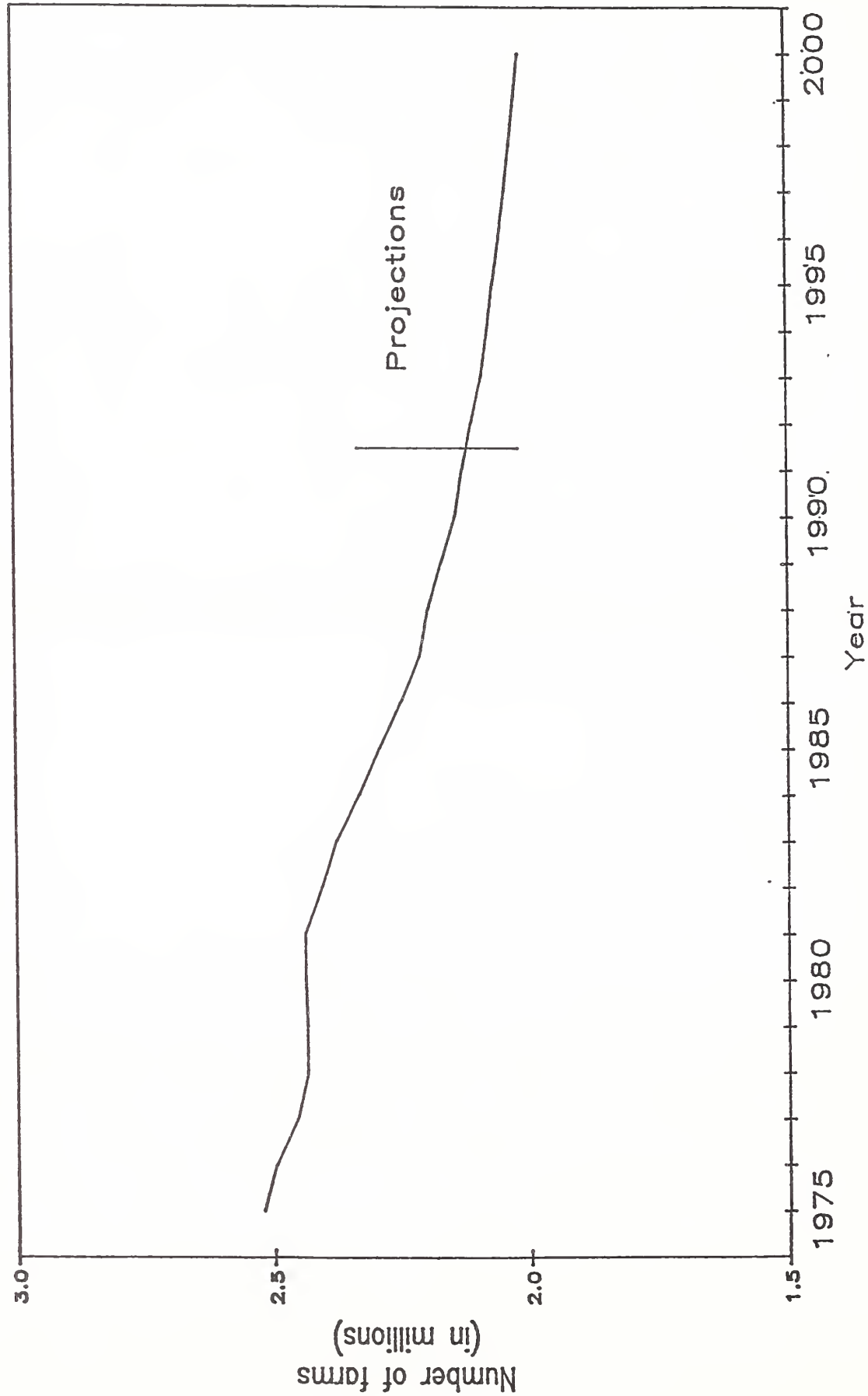
### Conclusions

Farm structural change in the 1990's will be more heavily influenced by outside economic forces than in the past. Past structural change that was induced by the major technological innovations of the 1950's and 1960's has about played out. Consequently, the trend component that dominated structural change until the early 1970's will become flatter and less dominant. Future farm structure will be determined largely by such factors as interest rates, the relationship between farm income and nonfarm wage rates, purchased input prices, international exchange rates and export levels.

It is difficult to characterize the typical American Farm. We have examined the farm sector from the perspective of business size and concentration of production. But there are other perspectives to farm structure, such as commodity specialization, which affect how the sector is organized. Commercial agriculture in the United States is organized along commodity lines and each commodity subsector has taken on its own structural features. Some parts of the farm sector, such as the poultry subsector, have taken on many of the structural characteristics of the non-farm industrial sector; others, such as cash grain farms, retain a more traditional structure. In a sense, the farm sector can be viewed as a collection of many different industries. Much care needs to be taken in evaluating the status of the farm sector and in designing farm policies to consider the varying characteristics, needs and objectives of different types of farms.

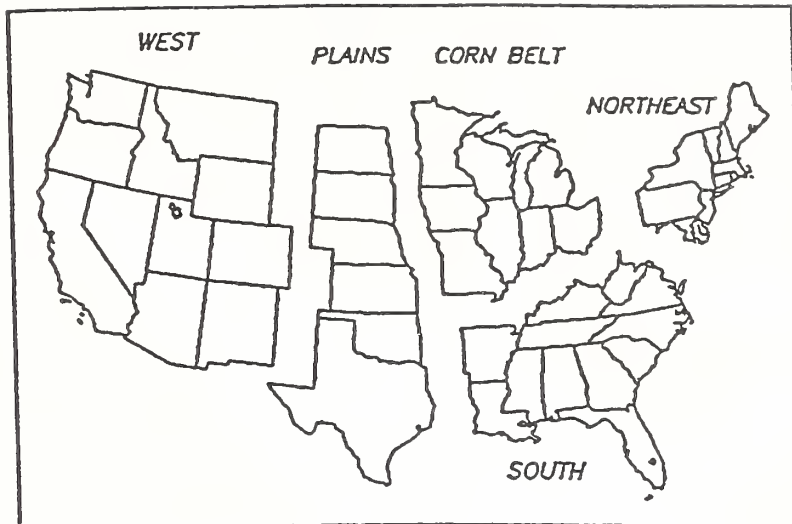
Figure 1.

# Number of U.S. Farms and Projections to the Year 2000\*

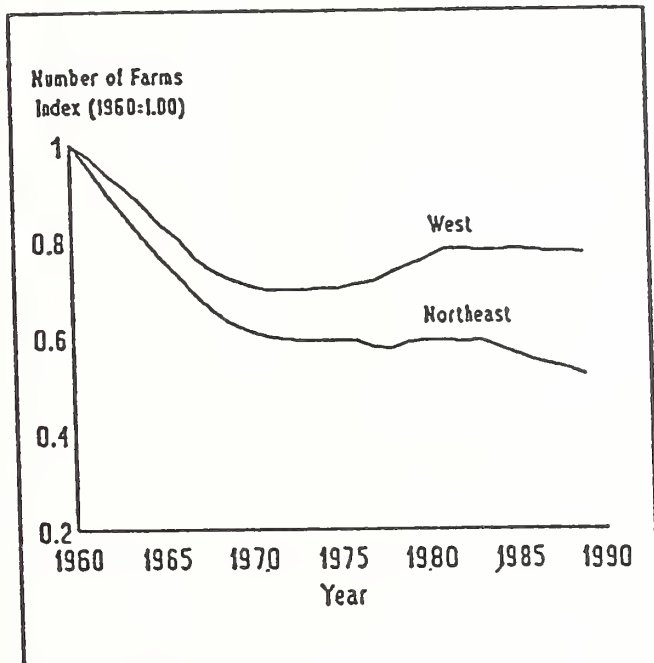


\* 1975-1989: actual data; 1990-2000: preliminary ERS projections.

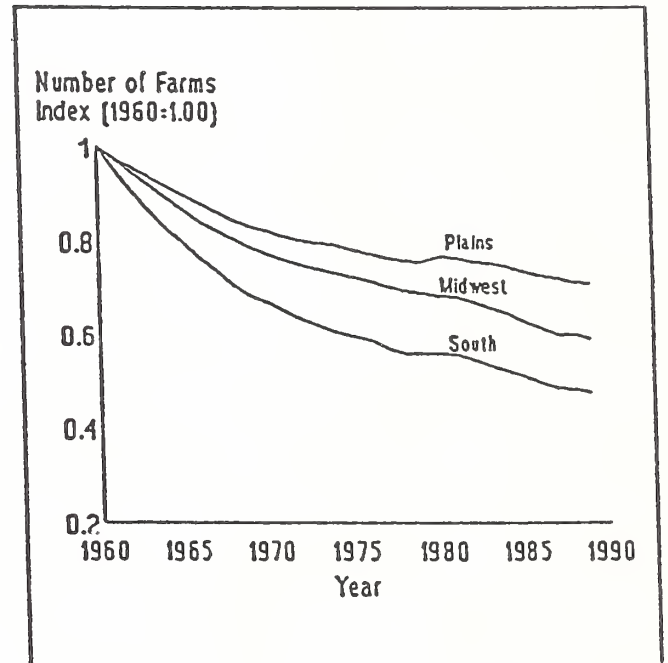
Figure 2.



Five U.S. Regions

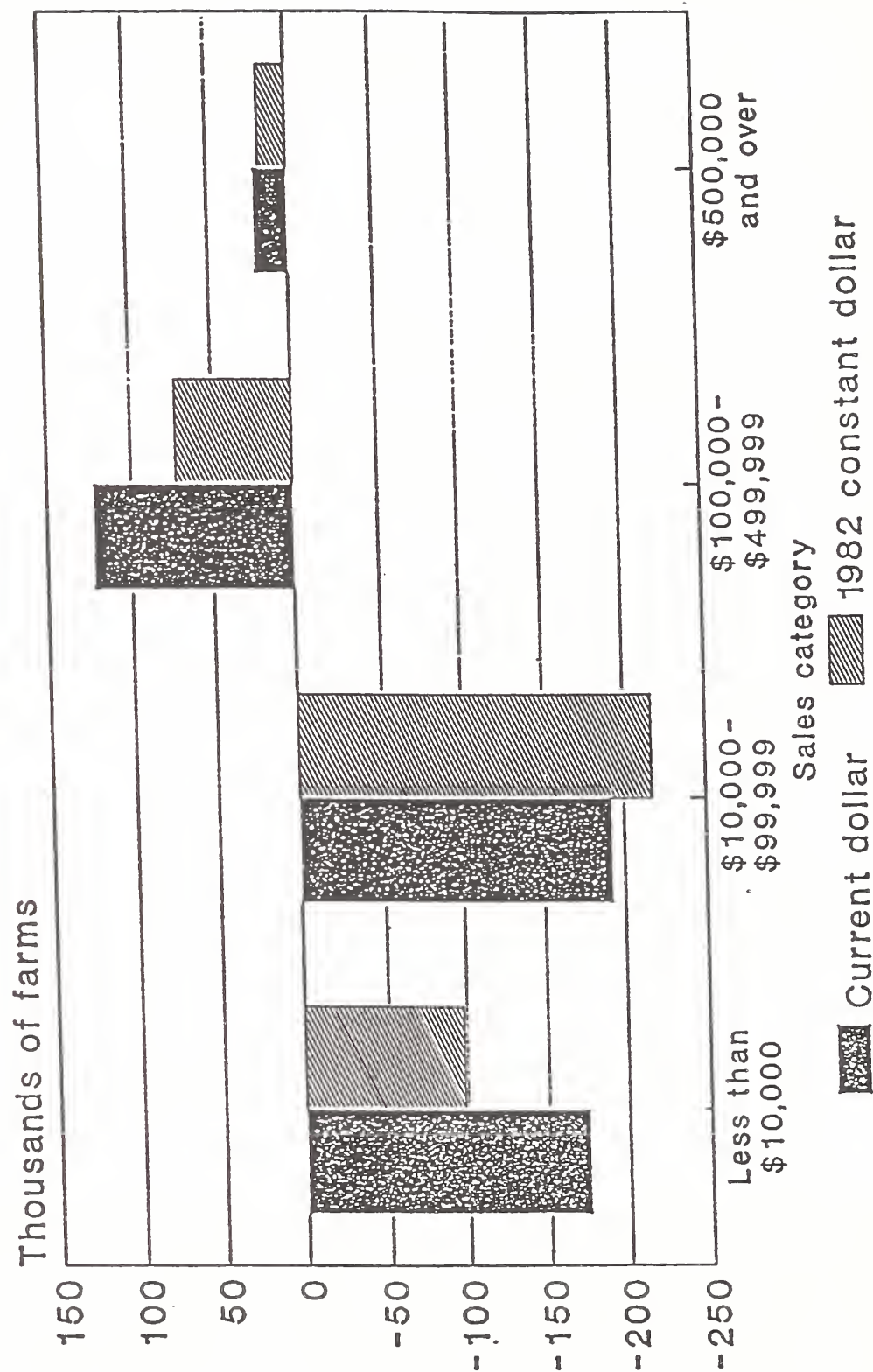


The number of farms in the Northeast and West stabilized during the 1970's and 1980's.



Farm numbers fell more steadily the Midwest, South, and Plains.

Fig. 3. Change in number of farms, current and 1982 constant dollar sales categories, 1974-87



Source: Current dollar sales, Census of Agriculture; 1982 constant dollar sales, Bureau of the Census unpublished data.



Figure 4.

Percent of Farm Operators Reporting Principal Occupation  
as Other Than Farming: 1987

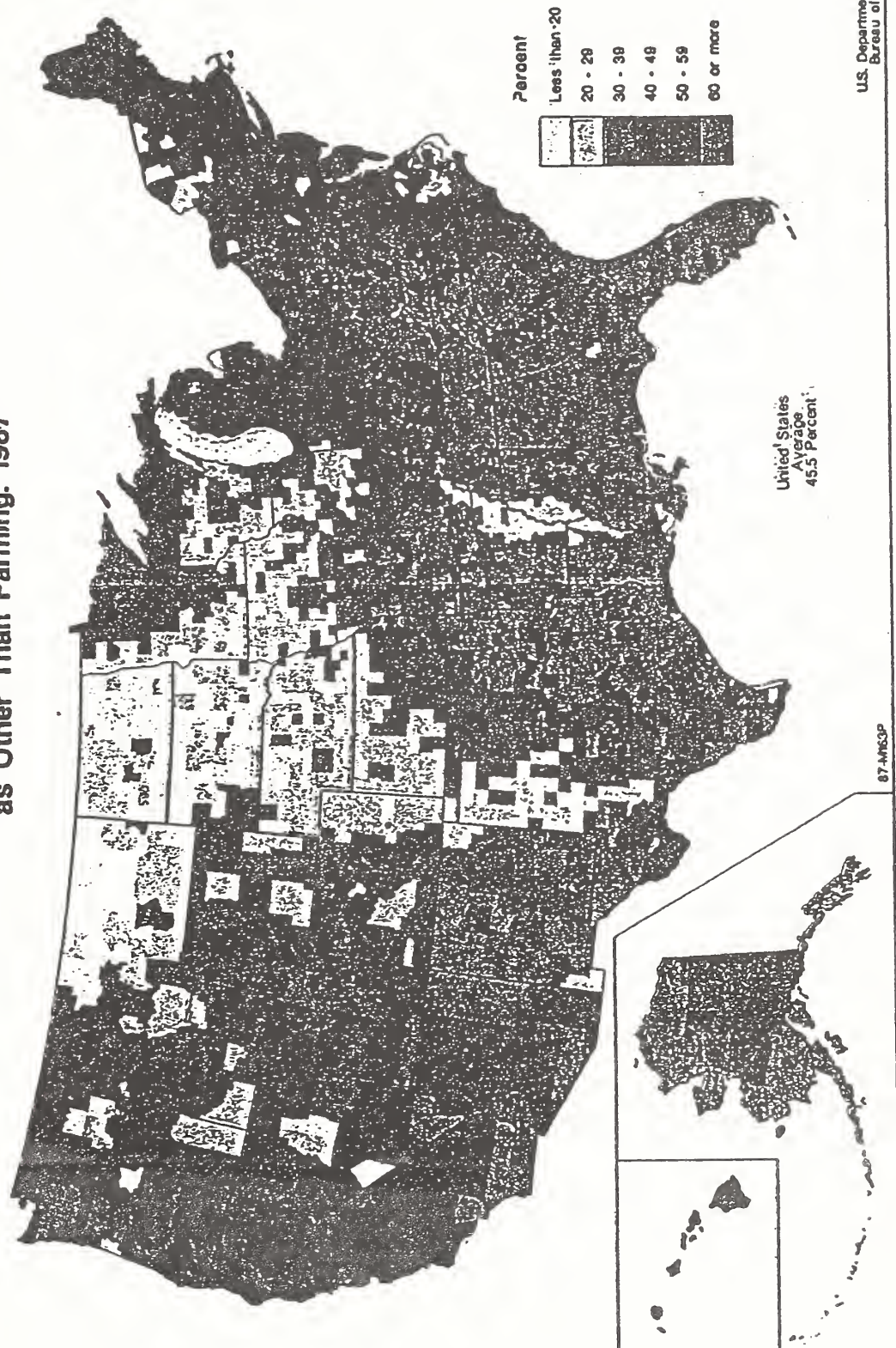
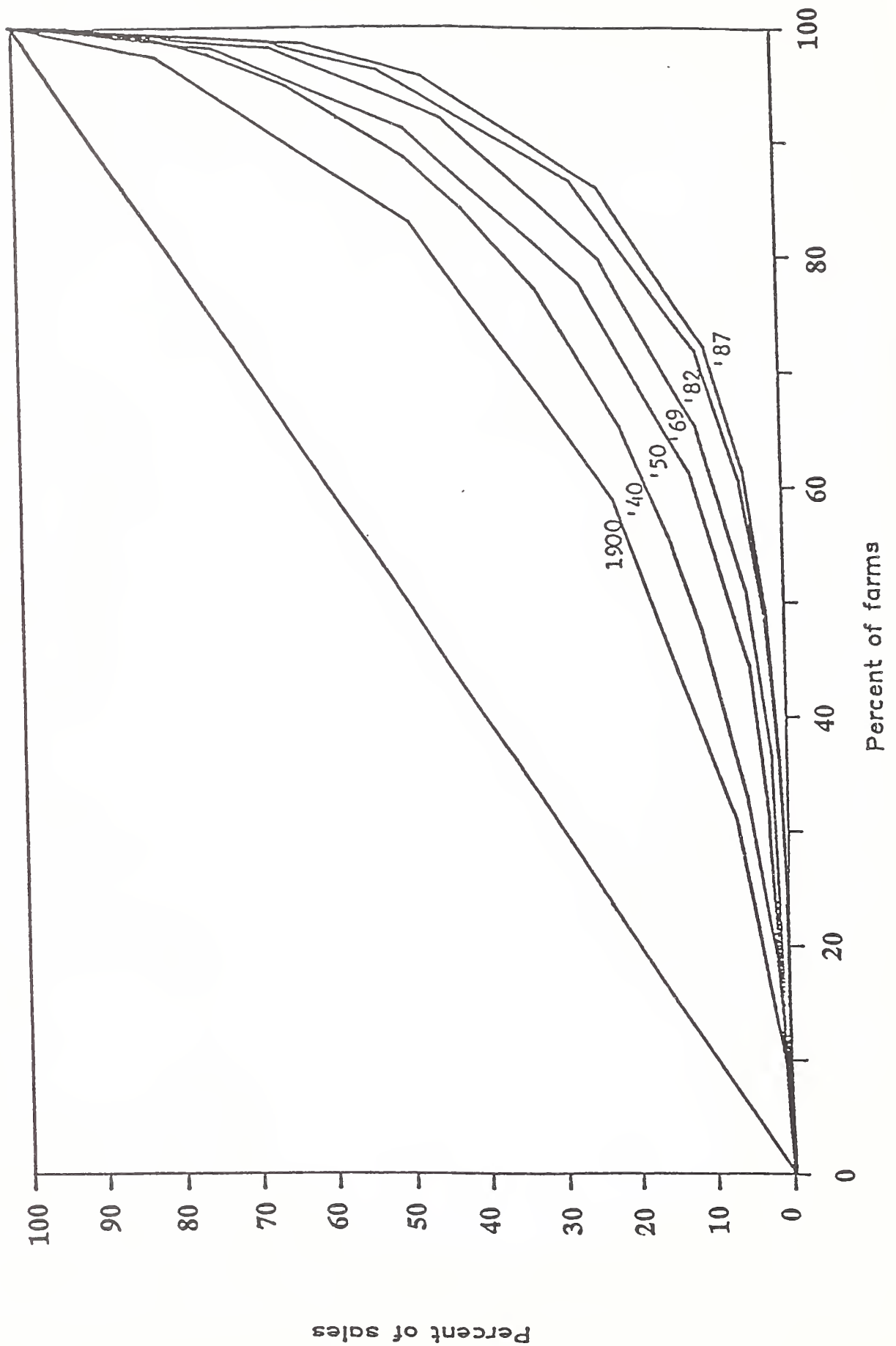


Figure 5. Farm production becomes more concentrated



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture

Washington, D.C. 20250-3900



Outlook '91, Session C17

Wednesday, November 28, 1990

## OUTLOOK FOR RED MEATS

John Ginzel  
Agricultural Economist  
Economic Research Service

The 1991 economic outlook is cloudy and uncertain and will likely lead to more conservative responses from both producers and consumers. Total red meat and poultry consumption for 1991 is forecast to be record large with the greatest increases occurring for poultry and with modest expansion for both beef and pork. Beef production is forecast to expand about as fast as population growth, about 1 percent, but pork production is expected to be about 3 percent above 1990. Feed grains, protein meal, and forage supplies are adequate to support the expansion with little change from this year's cost of production. Annual average retail Choice beef prices for 1991 are forecast to be near or slightly higher than this year. Average retail pork prices are forecast to show a slight decline. However, a completely different pork price pattern will emerge compared with this year--greatest year-over-year price increases are expected in the winter quarter with decreases likely for the later quarters as production increases from this year's cyclic lows.

### Greater Economic Uncertainty - More Conservative Responses Likely

In recent months, the economic outlook has become more clouded and uncertain. The extent of the perceived uncertainty by consumers and producers in coming quarters will likely induce more conservative responses. Relative to the past few years, a number of factors contribute to this increased uncertainty. Higher energy costs and inflation rates, international developments in the Middle East, the budget deficit, and the unresolved GATT trade differences are but a few. The U.S. economy has experienced nearly eight years of sustained economic growth but signs of slowing growth are apparent. Growth in Real Gross National Product for 1990 is likely to be about 1 percent compared with 2.5 percent a year earlier and 4.5 percent two years ago. Continued slow growth at near the 1990 rate is expected next year and the unemployment rate likely will increase. Interest rates are anticipated to decline as the economy slows with the prime rate likely to ease slightly in 1991 compared with 10 percent this year. However, this economic environment is expected to have less impact on the agricultural sector than many other sectors in part because the agricultural sector went through a substantial restructuring in the 1980's that some sectors are just now experiencing. Therefore, greater economic uncertainty is present for the factors that influence consumers demand for agricultural products than the availability and cost of inputs used by primary producer of red meats.

### Livestock Feed Costs Little Changed in 1990/91

The outlook for 1990/91 feed grain and protein meal supplies continue to be positive and indicate that feed costs for red meat producers will remain near year-earlier levels. This year's corn crop was estimated at 7.94 billion bushels as of November 1, up about 400 million bushels from a year earlier. But, carryout stocks in August 1991 are expected to decline to 1.2 billion bushels, down from 1.3 and 1.9 last year and this year's earlier, respectively. Farm level corn prices are expected to average \$2.20 to \$2.60 compared with \$2.36 this year. Wheat feeding this past several months was unusually large as tight old crop corn supplies allowed livestock producers to substitute lower cost new crop wheat into rations. Prices continue to favor wheat feeding in some areas. It is unlikely that wheat feeding next summer and fall will reach year-earlier levels. Soybean meal prices are expected to average \$160 to \$185 a ton for 1990/91 about unchanged from this year's \$173.50.



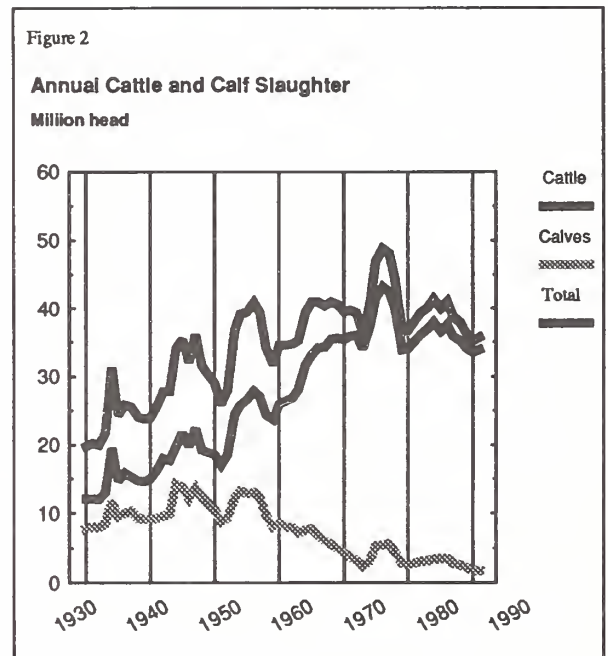
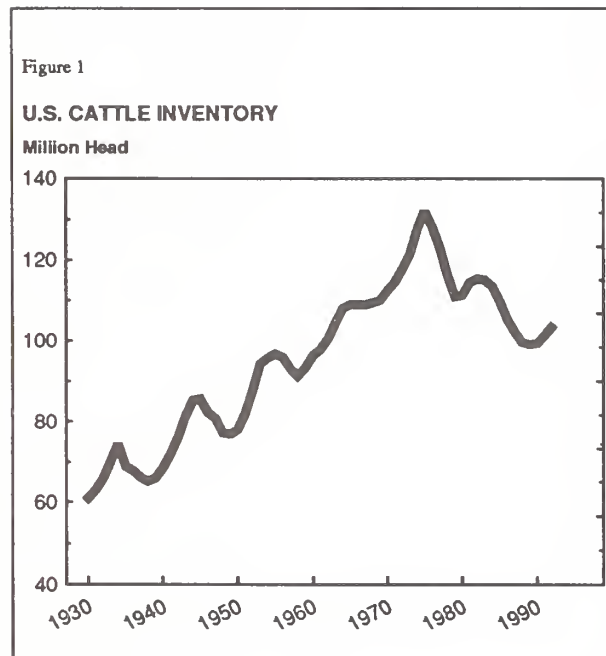
### Forage and Pasture Outlook is Favorable

Annual hay production in 1990 is estimated at 151 million tons, 4 percent above a year earlier. Alfalfa production is up 11 percent, while other hay production is off 3 percent. The total hay crop, combined with the larger carryover stocks on May 1, provides hay supplies 10 percent above last year and 17 percent larger than 1988/89. The farm all-hay price averaged \$86 a ton in October, up slightly from September and a year earlier. Apparently, producers have supported hay prices and are willing to build up hay stocks to ensure a greater safety margin as the cow herd expands. Pasture and range conditions in most areas are rated to be in better conditions than in recent years. The affects of drought are present in some areas but will be tempered by larger total hay supplies and favorable cattle prices.

### CATTLE

#### Longer Term- Cattle Herd Rebuilding

If a cattle cycle is seen as an expansion and liquidation phases of the annual cattle inventory, then the cattle sector has had six cycles since 1928. We



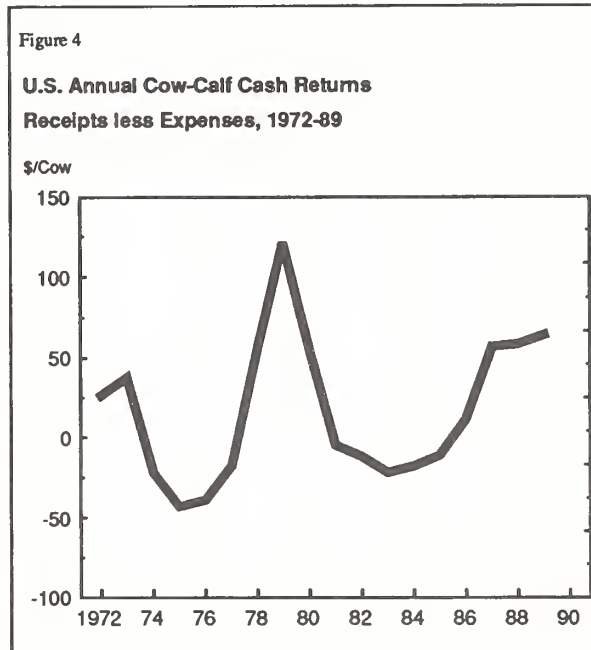
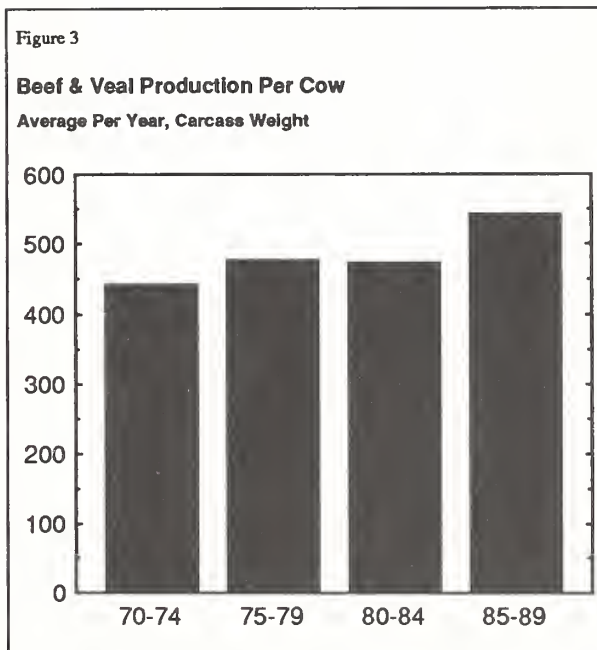
are now in the expansion phase of the seventh cycle. January 1, 1989 designates the end of the last cycle and the beginning of the expansion phase of the present cycle (fig. 1). A modest herd expansion is now underway and will likely last until the mid 1990's. However, the cattle herd will likely peak well below the mid 1980's or 1970's cyclic peaks, 115.4 million and 132.0 million head, respectively.

Several factors are contributing to expectations that the slowly growing cattle herd will produce larger quantities of beef, veal and milk. One factor is the trend of a smaller percentage of the calf crop being slaughtered as calves. This year, calf slaughter is forecast at about 1.8 million head as compared with 8 to 10 million head annually 30 years ago (fig. 2). Calf slaughter is expected to continue to trend lower in coming years but at a slower rate of decline than in recent years. Another factor is the increasing production per cow. During the last half of the 1980's, the annual average beef and veal production per cow in the herd was 542 pounds carcass weight, about 15 percent more than the first half of the 1980's (fig. 3).



## Cattle and Beef Outlook for 1991

The calf crop for 1991 is forecast to expand by about a half million head to 40.5 million due to favorable cow-calf operator returns and adequate forage supplies in most areas. Cow-calf operator receipts over cash expenses have been positive since 1986 and are expected to continue to be positive for the next several years. Last year, receipts over cash expenses were \$64 per cow and are forecast to be around this level for 1990 and 1991. Overall, the herd rebuilding has been quite constrained compared with previous periods of positive returns (fig.4).



The supply of feeder cattle is expected to remain tight in 1991. This the result of reduced calf crops the last few years and the incentive to retain heifers for replacements.

Next year cattle slaughter is forecast to increase to near 34 million head, 1 to 2 percent above 1990's level. The cattle slaughter mix is forecast to have a continued expansion in fed cattle to 79 percent of the total cattle slaughter. Non-fed steers and heifers are expected to continue to decline due to strong incentives to produce grain fed beef. Cow slaughter is expected to be near 5.9 million head, slightly above 1990's level but well below the preceding several years' as more beef and dairy cows are retained in herds. The greatest year-over-year increases in quarterly cattle slaughter are expected during the last half of 1991.

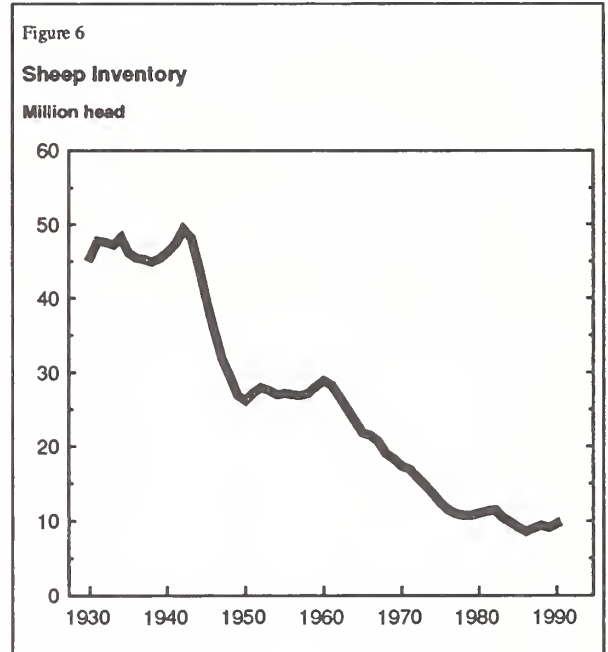
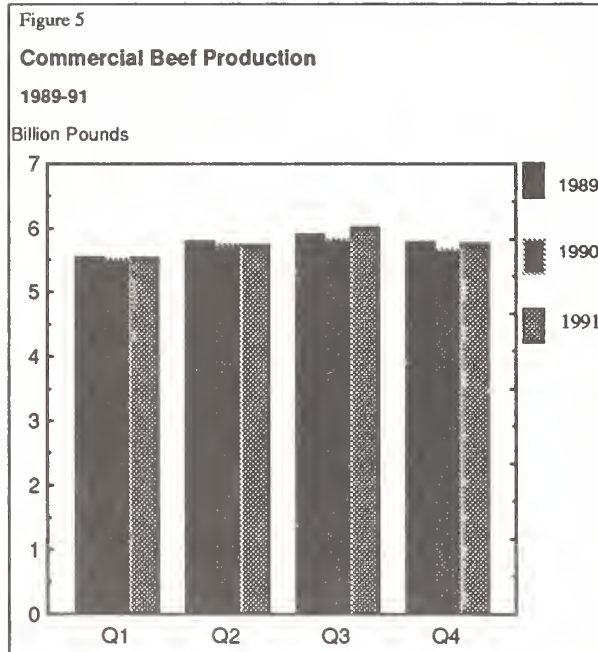
Beef production in 1991 is expected to increase 1 to 2 percent from this year's level and average slaughter weights are expected to be about unchanged (fig. 5).

This year, total cattle slaughter declined about 2 percent with beef production showing a smaller percentage decline due to increased average dressed weights. Fed cattle slaughter contracted less than 1 percent, while cow slaughter was reduced 8 percent. Dairy cow slaughter declined more than beef cow slaughter.

## **SHEEP**

### **Longer Term Sheep Outlook**

The U.S. sheep flock has been in a long term down trend but the industry appears to have begun to stabilize during the 1980's. The flock bottomed in 1986 at 8.66 million head and expanded to 9.65 million head on January 1, 1990. The flock at the beginning of 1991 is forecast to show little change as the retention of ewe lambs for breeding is seen as near average levels and 1990 mature sheep slaughter does not reflect unusual culling rates (fig. 6).



The expanding flock in the mid 1980's led to expansions in commercial lamb and mutton production. In 1991, commercial lamb and mutton production is projected to be about unchanged from this year's 363 million pounds (fig. 7).

## **HOGS**

### **Hog Cycle still Present, Expansion expected in 1991**

Following the grain price shocks in the mid 1970's, annual per capita pork consumption has held in a fairly narrow band with cyclical behavior during the 1980's. Since 1980, per capita consumption has generally been in the 60 to 65 pound range. Over this same period, substantial reductions in the numbers of hog producers has occurred as smaller scale hog farmers exited and more specialized larger scale producers accounted for an increasing proportion of the hogs produced. This trend toward fewer and larger hog producers is expected to continue with the producers remaining concentrated in the Cornbelt (fig. 8).

This year, pork consumption is forecast to be at the lower range of this band, 63.4 pounds per capita compared with 66.6 pounds in 1989. Hog producers returns for farrow-to-finish operations have been quite favorable during most of 1990, peaking around \$25 per cwt in the spring quarter (fig. 9). Given the extended period of positive returns and feed input prices and availability, hog producer's production response has been quite conservative in 1990. The present pork supply is tighter than earlier anticipated and may indicate that producers readjusted their actual farrowings below previously indicated farrowing intentions.

Figure 7

**Commercial Lamb and Mutton Production**

Quarterly 1989-91, Million Pounds

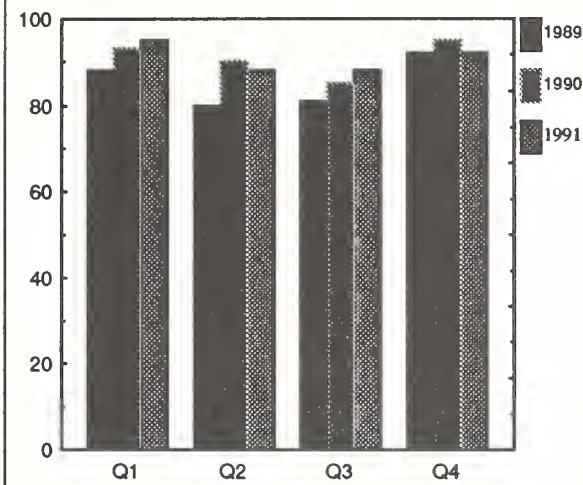
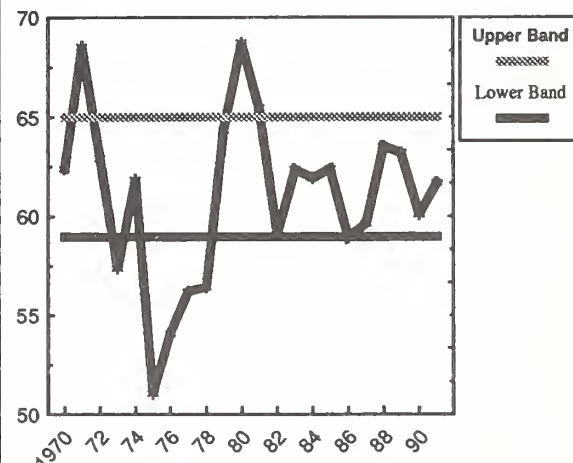


Figure 8

**Annual Per Capita Pork Consumption**

Pounds/ Capita



From a cyclical perspective, some expansion in pork output is expected in 1991, with annual pork production forecast to be up about 3 percent. Year-to-year expansion is expected to be getting under way by the spring quarter and accelerate throughout the year (fig. 10).

Figure 9

**Quarterly Farrow-Finish Returns**

Cash Receipts less Expenses, 1987-90

\$/cwt

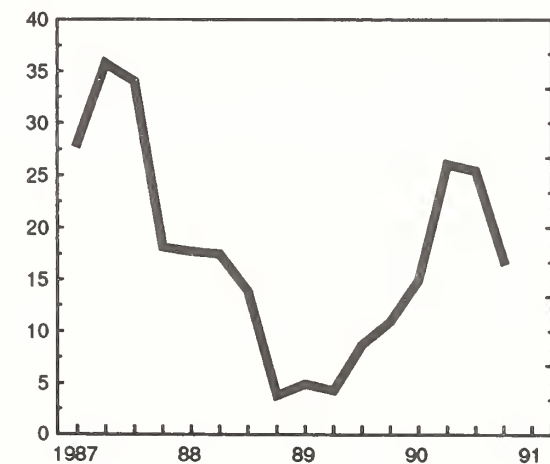
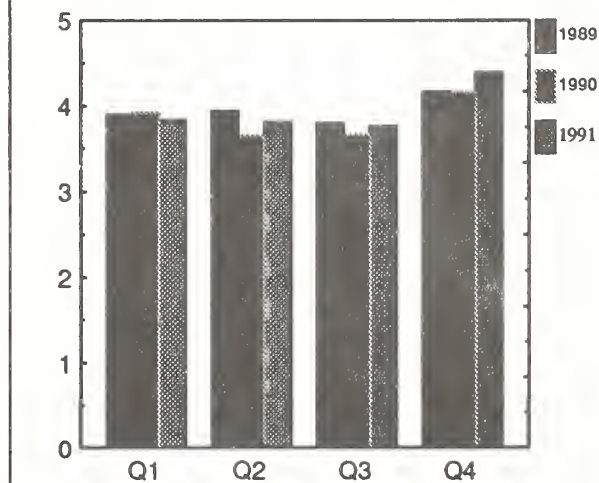


Figure 10

**Commercial Pork Production, 1989-91**

Billion Pounds



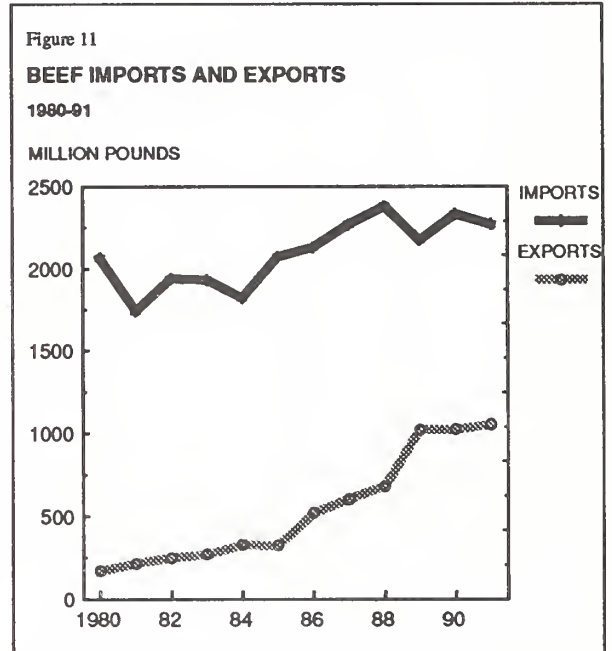
Pork stocks at the beginning of the fall quarter are at reduced levels and should be supportive for prices in coming months as stocks are rebuilt during the first half of 1991.



### RED MEAT TRADE PROSPECTS

U.S. beef trade during the 1980's showed a sharp increase in exports going from under 200 million pounds, carcass weight in 1980 to over 1 billion pounds presently while imports showed only a slight upward trend (fig. 11). The opening up of export markets for U.S. beef to the Pacific Rim nations has greatly increased U.S. exports of high valued beef to Japan and Korea.

Next year's beef export picture to Japan is more mixed. The sharp increase in beef shipments into Japan this year from the U.S. and Australia have swelled freezer stocks. The export potential becomes more uncertain as Japan switches away from regulation by the Livestock Industry Promotion Corporation (LIPC) and increases the ad valorem imported beef tariff from 25 percent to 70 percent. While the removal of the quota system is positive, it is unclear at this time what impact the new system will have on beef prices and the level of consumers purchases in Japan. Beef freezer stocks in Japan are seen as burdensome and will likely be drawn down in coming quarters. U.S. exports to Japan in 1991 are expected to hold about unchanged to slightly lower than this years expanded levels. Overall, U.S. beef exports for 1991 are forecast to be unchanged to slightly higher.



U.S. beef imports are expected to decrease next year. However, if Japanese beef imports slow in 1991, Australia will likely divert a larger share of their shipments toward the U.S. market. Overall, the U.S. will continue to be one of the world's largest net importers of beef during 1991.

The record high cattle prices in the U.S. is expected to result in continued large imports of cattle and calves. This year cattle and calf imports are expected to be record large totaling around 1.8 million head. In addition to the strong U.S. cattle prices, the free trade agreement with Canada and tariff reductions in Mexico for feeder steers shipped into the U.S. have stimulated expanded trade. Next year live cattle and calf imports into the U.S. are expected to be at about the same high level.

### Pork Trade Expectations

The U.S. continues to be a net importer of pork (fig. 12). Pork imports this year are expected to total around 920 million pounds carcass weight compared with below 900 million a year earlier and 1.13 billion two years ago. Next year a modest expansion is forecast to around 965 million pounds.

Pork exports are expected to expand to around 265 million pounds, carcass weight equivalent, in 1991 compared with 228 million this year. Overall the net pork trade in 1991 is forecast to be little changed from 1990 but substantially less than the 1986 through 1988 period due to less imports.

Cumulative live hog imports from Canada through August was 18 percent below a year earlier with all the decline in slaughter hog imports, off 26 percent. The import of feeder pigs, less than 110 pounds, increased by almost 34 percent. Unless countervailing duties on live hog imports from Canada are reduced, about the same to slightly fewer hogs are expected to be imported next year.

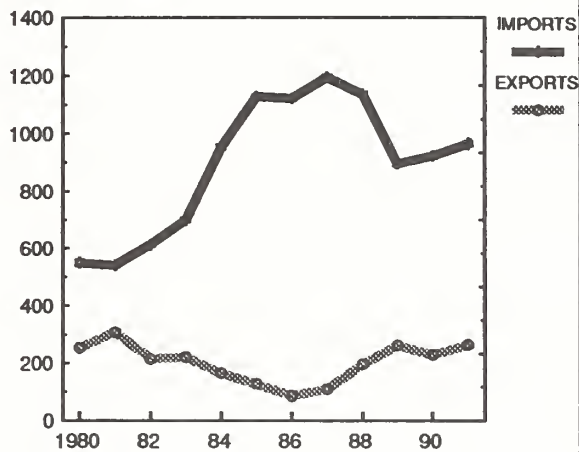


Figure 12

### PORK IMPORTS AND EXPORTS

1980-91

MILLION POUNDS



### PRICE OUTLOOK

#### Retail Price for Red Meats

For 1991, annual average retail Choice beef prices are forecast to hold at about the same level or slightly higher than 1990. This year the annual average Choice beef price is around \$2.79 per pound, up about 5 percent from 1989. Annual average retail pork

### Record Large Total Meat Supplies Forecast for 1991

Total red meat and poultry consumption for 1991 is forecast to be around 227 pounds per capita, retail weight, up about 6 pounds from the 1989 and 1990 record levels. The majority of next years' expansion is from the poultry sector with modest increase from red meats. Per capita beef consumption is forecast to be about unchanged in 1991 as supply expansion is offset by population growth. Pork consumption is forecast to expand slightly. Combined Veal and lamb and mutton consumption is again forecast to be less than 3 pounds per capita (fig. 13).

Figure 13

### Annual Per Capita Meat Consumption

Retail Weight, 1970-91

Pounds

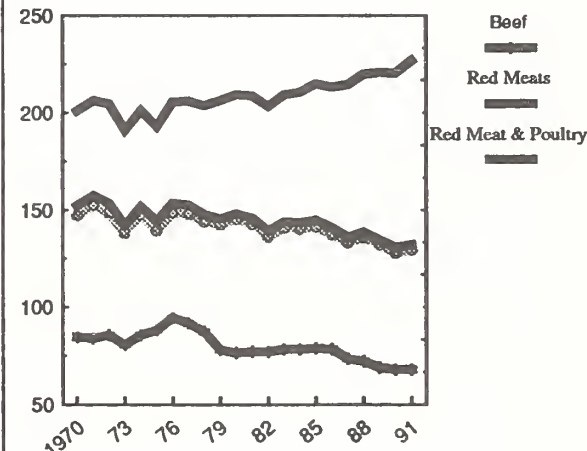
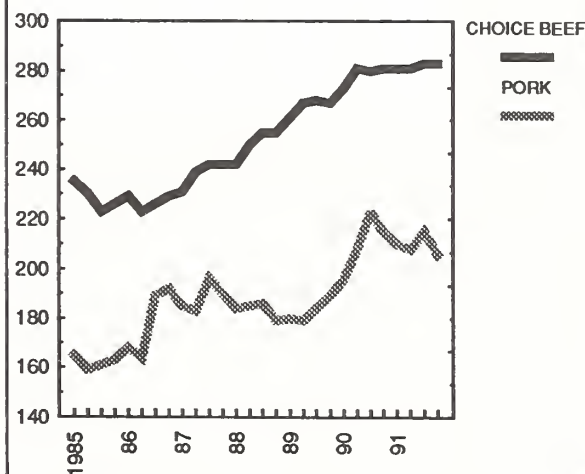


Figure 14

### QUARTERLY RETAIL BEEF AND PORK PRICES

CENTS / POUND

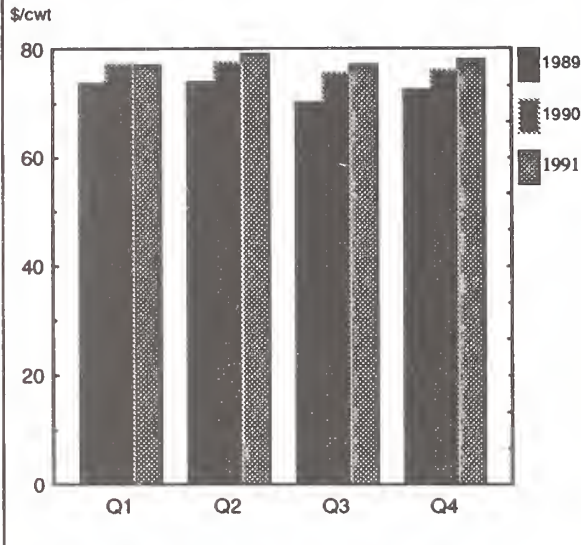


prices for 1991 are expected to average near this year's \$2.11 per pound with year-to-year increases early in the year and year-over-year declines later in the year (fig. 14). The sharp expansion in poultry supplies in 1991 will continue to see red meats prices advancing relative to poultry and provide increasing competition within the meat counters.

For all of 1991, prices for Choice steers at Omaha are forecast to average \$75 to \$81 compared with near \$77 this year and \$72.52 two years ago (fig. 15). This level of fed cattle prices and about unchanged costs of gain are expected to result in strong

Figure 15

**Quarterly Omaha Choice Steer Prices**



bidding for feeder and stocker cattle in 1991. Prices for 600-700 pound feeder steers at Kansas City are expected to hold near or above this year's \$90 per cwt with continuing strong premiums for lighter weight stockers to be retained on forage (fig. 16). Utility cow prices will continue to hold around this year's \$53 area or higher due to the forecast of a continuing reduced level of cow slaughter and strong demand by ranchers for replacement cows.

Even with record high beef prices this year, annual average lamb prices for 1990 are at depressed levels, around \$56 per cwt compared with \$67 in 1989 and about \$70 in 1988. Little change is seen for 1991 annual average lamb prices from these rather depressed levels as modest increases in lamb consumption have lead to sharp price declines relative to beef in recent years. The religious holidays in 1991

will occur earlier than usual and will provide earlier seasonal price strength than last year (fig. 17).

Figure 17

**CHOICE LAMB PRICES  
QUARTERLY, 1989-91**

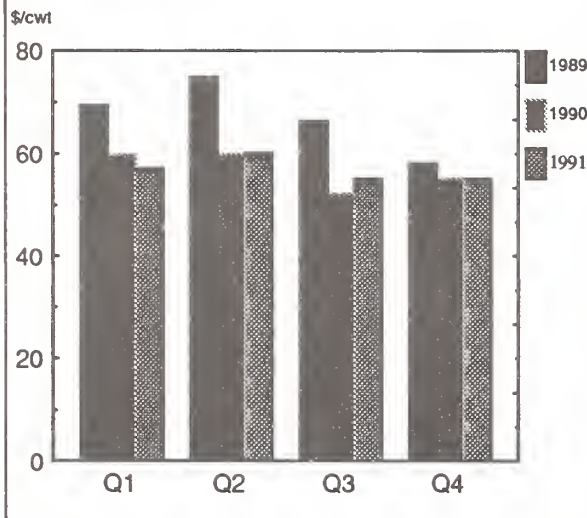
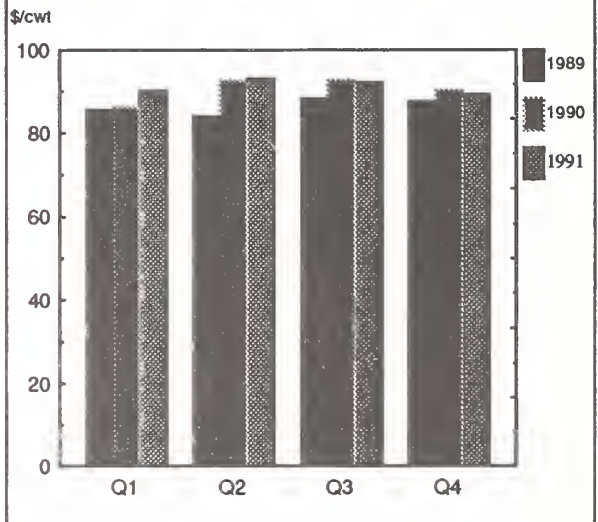


Figure 16

**FEEDER STEER PRICES**

KANSAS CITY 600-700#, 1989-91



Seven market barrow and gilt prices during 1991 are expected to average \$50 to \$56 compared with about \$55 this year and \$44 for 1989 (fig. 18). Year-

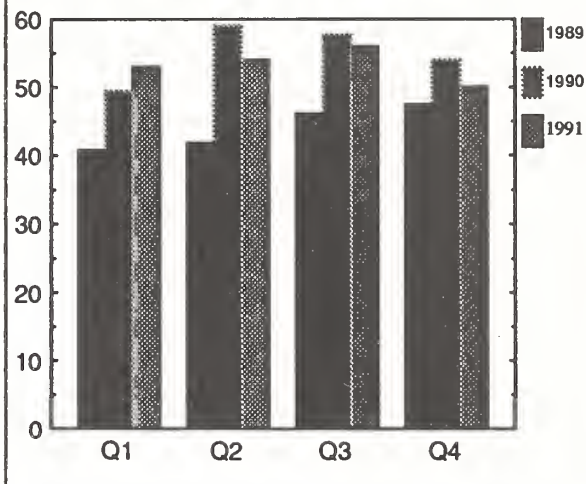
to-year advances in prices are expected to drop below the high levels seen in the spring of 1990. The extent of the last half of 1991 price declines depends upon the magnitude of the production increase, consumers reaction to very high retail pork prices and competition from the large poultry supplies. In the past hog and pork prices have reacted sharply, both on the upside and the downside, to changes in pork supplies.

Figure 18

**Barrow and Gilt Prices**

Quarterly 1989-91

\$/cwt



# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

United States Department of Agriculture  
Washington, D.C. 20250-3900



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## **OUTLOOK FOR POULTRY AND EGGS**

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**U.S. Department of Agriculture**

Production and per capita consumption of broilers and turkeys set new highs in 1990, continuing the growth that has come to characterize the poultry meat industry. Egg production rose slightly while per capita consumption declined, although only slightly. All sectors were profitable, although returns declined in the broiler industry relative to 1989, while eggs were about the same and turkeys rose slightly. Profitability was aided by stable and relatively low feed costs throughout 1990 and generally above-average wholesale product prices. Consumers continued to purchase more broiler and turkey meat available in many forms and marketed through numerous channels. Egg consumption continues to be adversely influenced by changing eating patterns and perceptions of the health and food safety risks.

Broiler production is forecast to continue growing in 1991 as producers continue to respond to the positive net returns experienced over the past several years. Growth will likely slow to slightly below the rate of 1990 to near the average annual rate of the past 10 years. Turkey production is also expected to continue growing, but more slowly than in 1990. Egg production is expected to increase slowly as producers temper their responses to the strong net returns experienced over the past several years, to avoid a repeat of the heavy losses experienced in 1987 and 1988. In 1991, turkey prices are expected to be unchanged, broiler prices will likely decline slightly while egg prices will move lower.

## **Factors Affecting Supply and Demand**

### **General Economic Environment**

The economic environment expected for 1991 can be characterized as one with increased uncertainties. Poultry producers will be



operating in a slow growing economy with a slightly higher rate of inflation. Real GNP growth is expected to average about 1 percent in 1991, the same as in 1990. The rate of inflation, as measured by the GNP price deflator, is expected to average between 4.5 and 5 percent in 1990 and be around 5 percent in 1991. Inflationary pressure from higher energy costs leaves little room for interest rates to decline significantly. The bank prime rate is expected to average about 10 percent in 1991, unchanged from 1990.

Real per capita income growth is expected to be slightly negative in 1991, following no growth in 1990. Consumer concerns over the state of the economy and the situation in the Middle East will likely be reflected in greater caution in expenditures for all items. More emphasis may be spent on "basics," with possible reductions for purchases of food items which have desirable convenience features but which in harder times can be done without. Since the invasion of Kuwait in August, oil prices have increased sharply, which will likely increase the costs of producing and transporting poultry and eggs. Foreign crude oil spot prices averaged \$35 per barrel in October, compared with below \$16 in June. The repercussions are likely to be felt into 1991 with higher prices for diesel, gasoline, and other petroleum-based products.

In spite of many uncertainties, 1991 likely will be a good, but less profitable year for poultry and egg producers. Stable feed costs coupled with product prices expected generally near or slightly below 1990 levels are expected to result in positive but slightly lower returns.

#### **Production Costs to Remain Stable**

Overall feed costs for poultry and egg producers are projected to be about the same in 1990/91 as in 1989/90. Corn production in 1990/91 is estimated at 7.94 billion bushels, up over 400 million bushels from a year ago. The average farm price is expected to average \$2.20 to \$2.60 per bushel in 1990/91 compared with \$2.36 in 1989/90. Beginning stocks were 1.34 billion bushels in 1990/91, down from 1.93 billion in 1989/90. A drought in 1991 likely could increase corn prices sharply, given the low level of stocks. Soybean production is estimated at 1.9 billion bushels in 1990/91, down one percent. Soybean meal prices are expected to average \$160-\$185 per ton in 1990/91 compared with \$173.50 in 1989/90.

#### **Total Meat Supplies Larger**

Total red meat and poultry production is expected to set a record in 1991, as it is expected to do in 1990. Beef production will likely increase about 1 percent in 1991 because of more fed cattle and cows. Pork production is expected to increase about 3 percent

in 1991, and broiler and turkey production will increase around 6 percent. Expected per capita disappearance of red meat and poultry in 1991, at near 227 pounds (retail basis), will increase over 6 pounds, or 2-3 percent. This increase will come from pork and poultry, while per capita beef disappearance will likely be stable.

## **Broiler Outlook**

### **Production Expansion to Continue**

Broiler production is expected to increase 5-6 percent in 1991, as growth slows in response to positive but lower net returns of 1990 and increased uncertainties about the future. This growth follows an estimated increase of about 6.5 percent in 1990 and will extend the long-run expansion of recent years that has averaged 5 percent annually since 1981. Total federally inspected broiler production will likely increase from an estimated 18.4 billion pounds in 1990 to around 19.5 billion in 1991. Consumption in 1991 will likely increase to 73 pounds per capita on a retail basis, up from 70 in 1990.

One indicator of planned broiler expansion is the size of the broiler hatching egg laying flock, an indicator of the short-run capacity to produce broiler chicks. The flock was up 7 percent on October 1 compared with a year earlier, suggesting intentions to expand broiler production in early 1991. Cumulative broiler pullet placements to the broiler hatchery supply flock, a longer-term indicator, suggest slower production growth in 1991. The hatchery supply flock for April 1991, based on broiler-type pullet placements to the hatchery supply flock 7-14 months earlier, is estimated to be 6 percent larger than a year earlier, compared with 9 percent in April 1990. Production increases are expected to be greatest in the first half of 1991, with first-and second-quarter production estimates up about 6 and 7 percent, respectively. Production increases in the second half will likely ease to around 5 percent, particularly if net returns weaken in the first half.

### **Broiler Prices to Be Slightly Lower in 1991**

The expected 5-6 percent increase in production next year, coupled with large red meat and turkey supplies, will probably push prices slightly lower, but a continued favorable demand for poultry meat will be partially offsetting. The average 12-city wholesale price is expected to be in the 51-57 cents per pound range, down from 54-55 cents in 1990. First-quarter prices may average 50-56 cents per pound. Prices are anticipated to follow a typical quarterly pattern, gaining strength in the second and third quarter before dropping in the fourth quarter.

The 12-city wholesale broiler price will likely average 48-50 cents per pound in fourth quarter 1990, compared with almost 50 cents a year earlier. Average broiler prices for the first three quarters of 1990 were relatively constant, around 57 cents per pound, 2-3 cents below a year earlier. Prices were supported throughout the year by higher red meat prices and record broiler exports.

Retail prices in 1991 are expected to average around 86 cents per pound, slightly below the 89 cents estimate for 1990. Strength in the average retail prices for whole fresh fryers in 1990 has held prices only 3-4 cents per pound below 1989.

### **Positive Net Returns to Continue**

The expansion and positive returns experienced by the broiler industry in the last half of the 1980's and 1990 has provided a strong foundation for continued industry growth. According to USDA estimates, the average net returns, on a whole bird, ready-to-cook basis, have been positive for all quarters except one since the first quarter of 1984. Some of the earnings of the late 1980's have been reinvested in remodeling existing facilities and in the construction of new broiler production complexes, some near existing facilities, and some in new areas, such as in Kentucky, near large supplies of grains. These investments provide for additional production and continued industry growth.

Average net returns for 1991 are estimated around 8 cents per pound, about the same or slightly below those of 1990, as average wholesale broiler prices are expected slightly lower and feed prices are expected to change little. The cost of production in 1991 will average 46-47 cents per pound on a ready-to-cook basis, about the same in 1990.

### **World Production Increasing**

Broiler production world-wide is expected to increase around 4 percent in 1991 following nearly a 5 percent rise in 1990. The largest producers, which generate about 75 percent of the world production, are the United States, the European Community (EC), Brazil, the Soviet Union and Japan. Production growth in Japan and the EC slowed in 1990.



## **U.S. Exports Increase**

U.S. broiler exports will be a record in 1990 and exceed one billion pounds with value of over \$525 million. This is an increase of 35-40 percent over year earlier levels. The sharp increase in exports was the equivalent to slightly over 1 pound of domestic use per capita. Growth was led by new exports to the USSR, which replaced Japan as the largest U.S. customer, continued strong but stable sales to Japan, and sharp growth to Hong Kong. Large supplies of reasonably priced legs and leg quarters helped the U.S. competitive position in world broiler trade. Broiler parts represented 95 percent of the 1990 exports. Six major buyers, the USSR, Japan, Hong Kong, Mexico, Canada, and Singapore took almost 80 percent of the broiler exports.

## **New Export Record Expected in 1991**

U.S. broiler exports may well set another record in 1991, at over 1 billion pounds, or almost 6 percent of estimated production. Exports in 1991 are expected to benefit from continued and likely improved access to major long standing markets such as Japan, Mexico and Canada and to new markets in the USSR. One factor which will likely impact the level of 1991 purchases by the U.S.S.R. will be their foreign exchange levels and the availability of credit programs for purchases such as GSM 102. Whether such credit is granted is intertwined with other issues related to U.S./USSR relationships.

Exports to Japan should increase due to a lower U.S. dollar relative to the yen and continued competitive U.S. prices. The Hong Kong market is expected to at least hold steady at a high level. Exports to Mexico are highly dependent on fluctuating trade policies of the Mexican Government. Continued growth in exports to Canada are expected due to the bilateral trade agreement provisions for increases in the global import quota. Singapore is likely to continue as a stable market. Increases in exports to the Middle East will depend in part on the Export Enhancement Program (EEP) but also on the actions of other exporters. Brazil, for example is expected to reduce its broiler exports as it focuses on supplying domestic demands.

Exports in 1991 will build on the 1990 expansion, which has been spurred by USSR purchases of large amounts of relatively low priced dark meat parts to meet domestic needs. Most exports are again expected to be commercial sales, as in 1990. However, export sales under the EEP in 1990, at around 25 million pounds through October, are 40 percent above the small sales of 1989, but well below the 1987 high of 200 million pounds.



## **Turkey Outlook**

### **Turkey Growth to Slow**

Turkey production for all of 1991 is expected to increase 5-7 percent, to around 4.8 billion pounds. This follows the above-average 9 percent increase estimated for 1990. Turkey production continues to increase, after nearly doubling from 1980 to 1990. The improved returns experienced by producers in the fourth quarter of 1990 will encourage expansion next year.

Turkey production for first-quarter 1991 is estimated to increase 5-7 percent above a year-earlier, down sharply from the 22 percent year-over-year increase for first quarter of 1990. This forecast is based on September and October poult placements, and possible spillover of slaughter from December to January due to expected slaughter plant holiday schedules. Quarterly increases of about 6 percent are expected in both the second and third quarters, followed by a 5 percent in the fourth. With strong positive returns in the fourth quarter of 1990, increases in placements in 1991 are likely, and production in the second half of 1991 is expected to increase 5-7 percent, faster than in 1990.

### **Turkey Prices to be Unchanged**

Average wholesale prices in 1991 are expected to remain nearly the same as in 1990 with slight increases likely early in the year. Continued high prices for red meats will help turkey prices, as will the support to the market provided by the continued growth in purchases of processed turkey meats. Eastern region hens are expected to average 61-67 cents per pound compared to an estimated 64 cents this year. The quarterly price levels and patterns for 1991 are expected to be similar to those of 1990. Eastern region wholesale hen turkey prices are expected to average in the high 50's cents during first-quarter 1991, compared with 57 cents a year earlier. Prices will strengthen to the low 60's in the second quarter, and increase seasonally to the high 60-low 70 cent per pound level in the second half, near 1990 levels.

### **Prices Gained Steadily during 1990, but Averaged Below 1989**

Wholesale turkey prices moved up steadily in 1990, following weakness in the early months. In the second half prices strengthened and moved above year earlier levels in the third quarter as production grew only moderately. High red meat prices supported these increases in the face of continued turkey production growth. October hen prices rose sharply to the highest level in two years. Fourth quarter prices are being pressured by the seasonal draw-down of near record stocks and by the winding down of Thanksgiving sales coupled with strong production growth in December. For the fourth quarter, Eastern region hens are expected

to average 69-71 cents, about the same as last year. Prices for the year remained strong, given large supply increases, and will average about 64 cents, lower than last year's 66.7 cents per pound.

### **Per Capita Consumption To Increase**

Per capita consumption of turkey is expected to be over 19 pounds in 1991, up one pound from 1990. Influencing the continued increase in year-around consumption has been the growing availability of turkey in convenient further-processed products. Near record turkey stocks on October 1 encouraged heavy holiday feasting and will result in record per capita consumption of about 18.3 pounds in 1990. Even with increased turkey and other meat supplies, retail turkey prices are expected to remain steady in 1991. Whole turkeys are expected to average about \$1.00 per pound, about the same as in 1989 and 1990.

### **Turkey Returns to Improve**

Turkey returns improved in 1990 and are expected to continue in 1991. Average net returns for turkey producers in 1991 are expected to remain about the same or just slightly higher than in 1990, reflecting expectations of no changes in feed costs. Returns are also expected to be favorable in the fourth quarter of 1990, at about 5-7 cents per pound. While returns are estimated at only slightly above breakeven levels for the year, they will be better than the slightly negative returns for the previous three years.

### **World Production Increasing**

World production of turkey is expected to rise about 5 percent in 1991, compared with over 6 percent in 1990. The United States will remain the leading turkey producer in 1991, producing nearly 60 percent of world production. Other leading producers include the European Community, the USSR, and Canada.

### **Turkey Exports Unchanged**

U.S. turkey exports during 1991 are expected to be around 45 million pounds, about the same as in 1990. Ample supplies at generally moderate prices are encouraging exports, which represent about one percent of total U.S. turkey production. The greatest potential for increases in 1991 are in the Pacific area, especially in Hong Kong and South Korea. Growth in exports to these countries is fostered by a combination of strong economic growth, emerging tastes for turkey meat products, and the high costs and low levels of domestic production.

Turkey exports for 1990 are expected to be up 10-12 percent from 1989, to around 45 million pounds. Parts make up about 80 percent. Mexico continues to be the leading buyer, taking about 25 percent of U.S. turkey exports. Mexican production has slumped due to poor returns.

## **Egg Outlook**

### **Slow Production Increase Likely in 1991**

Total egg production for 1991 is estimated to increase around 1 percent to 5.7 billion dozen, the same rate of increase as in 1990. Hatching egg production increases expected at 4-5 percent reflect the expected expansion in the broiler industry. Table egg production in 1991 is anticipated to increase about 1 percent, to around 4.9 billion dozen, following fractional increases in 1990. Most of the 1990 increase was in hatching eggs for the broiler industry.

Table egg producers continue to expand slowly in response to the favorable net returns experienced during 1989 and 1990, and not as quickly as past reaction patterns would suggest. Some profits have been used for debt repayment, laying the groundwork for a financially stronger industry. Producers generally kept the average table-egg flock size below year-earlier levels throughout 1990. Expansion efforts appear to reflect a more conservative approach to flock expansion by producers who survived the bleak period in the industry experienced in 1987/1988. The table-egg laying flock size in 1991 is expected to increase only slightly from 1990. The egg-type chick hatch in August and September was about even with a year earlier, and there are small increases in the cumulative placements of egg-type pullets for hatchery supply flocks in the first half of 1991.

### **Prices to be Generally Lower in 1991**

Wholesale New York egg prices in 1991 are expected to average 71-77 cents per dozen, as increased supplies push prices below the expected 1990 average of 81 cents. These estimates assume no significant restrictions on movement of table-eggs to market associated with salmonella enteritidis in the laying flocks. Fourth quarter 1990 prices are likely to be 85-86 cents per dozen, compared with 93 cents a year earlier. First-quarter 1991 prices likely will average around 72-78 cents per dozen, but could decline to the high 60's in the second quarter before returning to the 72-78 cent area in the second half. Increased supplies will put pressure on average retail prices, which are expected to decline to the mid-80's in 1991, down from 99 cents per dozen in 1990 and 1989.



### **Consumption to Decline Slightly**

Per capita consumption of eggs in 1991 is likely to be around 233 eggs, down about one egg from 1990. While the long-term trend of reduced per capita consumption appears to continue, it has slowed the past two years. The use of eggs in egg products is becoming increasingly important, and represents about 46 eggs, almost 20 percent of per capita utilization. This use rose almost 9 percent in 1990 and continued growth in 1991 is expected.

### **Net Returns to Continue Positive**

Egg producers can expect positive net returns in 1991 for the third consecutive year. However, average returns will likely be lower than in 1990 and 1989, reflecting lower egg prices, and feed costs about the same as in 1990. Returns in 1991 are expected to be strong during the first quarter, decline in the second after the Easter market, and firm up in the third and fourth quarters.

Average net returns have been positive for all of 1990, although second-half levels are below the very high levels of a year-earlier. Returns are expected to remain positive for the rest of the year and average around 15 cents per dozen, about the same as in 1989.

### **World Production Increasing Slowly**

World egg production is forecast to increase about 1 percent in 1991. The world's largest egg producing country is China, which will likely increase its production by 2 percent. Production in the Soviet Union, the second largest egg producer, will likely increase one percent in 1991. World production is estimated to increase only fractionally in 1990. China likely increased its production by 1-2 percent, but production in the Soviet Union will likely be unchanged while Japanese production declined. The EC and the United States, coupled with China, the Soviet Union, and Japan, continue as the five largest egg producing areas.

### **Exports to Increase**

U.S. egg exports are expected to increase about 10 percent to around 95 million dozen in 1991 as domestic prices ease from the relatively high levels of the past two years. The expected lower value of the dollar relative to the yen and some other currencies, coupled with exports under the EEP and sales to Canada will also be important factors influencing 1991 exports.

About 1-2 percent of total U. S. production is exported. Egg exports will be down about 5 percent in 1990, to 87 million dozen shell egg equivalents, primarily due to reduced egg product exports



to Japan, the major egg product export market of the U.S. However, export value increased around 10 percent, to \$95 million primarily because of higher export unit values for egg products. Exports to Japan declined because of EC subsidies on egg exports to Japan and relatively high U.S. prices. EEP sales more than doubled in 1990, with almost all going to Hong Kong where domestic production declined. Total egg exports are up sharply to Canada which may replace Japan as the largest market in 1990. Slightly over one-half of the eggs to Canada are for hatching. The composition of egg exports in 1990 are estimated to be 40 percent egg products, 32 percent hatching eggs and 28 percent table eggs.

### **Egg Imports to Decline**

Egg imports are expected to continue to decline in 1991 as relatively lower U.S. egg prices make imports less attractive to U.S. egg processing companies. Imports declined by about 50 percent in 1990, to 12 million dozen, over 90 percent of which were shell eggs for breaking. Price increases by Germany and Finland, the largest suppliers, also contributed to the import declines in 1990.

### **Beyond 1991**

The profitability of the poultry and egg industry in the 1990's will be influenced by the decisions made by producers and processors in response to forces influencing the supply and demand for poultry meat and eggs. Poultry meat producers, who have been conditioned to profitably market more product year in and year out, face the challenge of managing rapid growth in a period of increased economic uncertainties. While egg producers also face the problem of balancing supply and demand, the egg industry has already experienced significant supply adjustments, and faces greater challenges in trying to influence the demand for eggs.

### **Production Efficiencies**

The poultry industry has been very effective in developing and rapidly adopting technologies resulting in more meat and eggs per pound of feed. The industry takes pride in readily adopting new processes and tailoring its product to the marketplace. Vertical integration of the industry has allowed it to capture efficiencies from the production through marketing stages. The degree of integration varies between the sectors, with broilers the most integrated and eggs the least, but all are moving towards more integration and greater concentration.

The industry is evolving from its beginnings as a "pure" industry, with firms generally producing and marketing only broilers or

turkeys. Brands were initially regional and the number of products from any one firm relatively few. Clearly the trend is towards the proliferation of many forms of poultry products, tailored to a wide variety of consumers, household composition, and lifestyles. National, rather than local or regional markets are emerging, which will make product and market development more complex. Market identity between products and regions will likely become more blurred as broiler and turkey products increasingly become only one among many marketed by large companies. Production in the poultry and egg industry is evolving into fewer and larger firms. Some are heavily involved in the production and marketing of other meats and other foods in addition to poultry and eggs.

Production costs, shaped primarily by the costs of grain, technological efficiencies, and organizational efficiencies, will likely continue to be relatively low, and continue to enhance the competitive position of the industry. The long-term prospects for feed costs are good, based upon expectations of ample supplies of grain and protein available at reasonable prices. Improved feeding efficiencies and other developments to reduce both the feed and time requirements to produce a pound of poultry meat or a dozen eggs will continue to lower production costs, although perhaps at a less dramatic rate than in the past. However, while lower feed costs will aid the poultry industry, it will also encourage expansion in red meat production.

The industry will be facing increased environmental restrictions, which may increase the costs of production and influence expansion decisions. Waste management and water quality issues will become increasingly important for both producers and processors, and will likely influence decisions on where to expand existing facilities or to build new production complexes.

### **Competitive Environment**

Expansion by broiler and turkey producers will result in more meat to sell in an increasingly competitive environment. If broiler production continues to grow at the average annual rate of almost 5 percent experienced during the 1980's, production would increase by one-fourth between 1990 and 1995. Substantial increases in turkey production are also expected. As total per capita meat consumption grows and perhaps reaches a satiation level there will be increased competition among all meats for the consumer's dollar.

### **Unsettled Economic Conditions**

Broiler, turkey, and egg producers sell in a continually changing market, where tailoring of product to sometimes fickle and diverse consumers is a continual challenge. Sale of poultry products

during the 1980's was aided by a strong economy, declining real prices, low prices relative to other meats and a consumer who was demanding low fat, low cholesterol meats. While consumers are price sensitive, they are increasingly seeking attribute in a product beyond just getting a good product for a price. Some purchase decisions are based upon a complex set of rules, some price sensitive, but others reflecting other "consumerism" concerns. Issues such as convenience, food safety, and packaging materials used by fast food restaurants as well as the traditional questions of price and quality will shape the future in which the poultry industry will operate.

### **Export Orientation**

Although the United States is one of the world's major poultry meat exporters, production in the U.S. has historically focused on the domestic market, with exports representing only 2-6 percent of annual production. As the industry continues to expand beyond levels of domestic needs, exports will become more important, for both broilers and turkeys, but especially for broilers. Exports will increasingly become a major market to be developed and treated seriously rather than primarily as an "outlet" for products in oversupply in the domestic markets. The years ahead will offer an opportunity to tailor export products from start to finish with specific markets and products in mind. Such tailoring will be needed to compete in and take advantage of a world market where trade barriers will likely decline, and where price and product competitiveness will become the primary determinants of trade flows.



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## THE U.S. BEEF PACKING INDUSTRY: CHANGING MARKET STRUCTURE AND PERFORMANCE IMPLICATIONS

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In the last decade the U.S. beefpacking industry underwent a more radical market restructuring than has been witnessed in any food industry in the last fifty years. The historically unprecedented surge in market concentration has raised fears that a new "Beef Trust" is in the making. Concern about market structures is justified by a long tradition of industrial-organization studies that have demonstrated quantifiable impacts on the quality of the resulting market performance. Competitively structured markets lead to fair prices for buyers and sellers alike, but monopolized markets tilt the playing field to the advantage of those with market power. Allocative efficiency suffers, and incomes are redistributed from the less powerful to those that control the market.

My task today is to examine the economic evidence of market power in the U.S. beefpacking industry. "Market power" has a precise meaning in economics and in the law: it is the ability to exercise some discretion over buying or selling prices or the power to exclude would-be sellers from entering markets. In competitive markets, every participant is a price taker, but in monopolistic markets at least one buyer or seller is a price maker. The questions I address are: Do some meatpackers wield market power now? Is their market power still only emerging from the new structural conditions? Or, are there other factors that will restrain the acquisition of market power for the foreseeable future?

### Historical Background

When viewed over the last century or more, the changes in the market structure of the U.S. beef subsector resemble nothing so much as a roller coaster. Beef slaughtering and processing were dispersed on-farm activities until well after the Civil War. During the 1880s, meatpacking was among the first food industries to become significantly monopolized. The appearance of a radically new distribution technology, the mechanically refrigerated rail car, and new corporate forms of ownership provided the stimuli for both horizontal mergers and extensive vertical integration. The "Beef Trust" controlled about 85% of U.S. sales of dressed beef in the 1880s (Yeager 1982).

The machinations of the Beef Trust, believed to have depressed Western cattle prices and elevated retail beef prices in Eastern cities, were in no small measure responsible for the Sherman Antitrust Act, which became law in July 1890. Later, by order of President Wilson, the Beef Trust



became the target of the first investigation of the newly established Federal Trade Commission. As a result of the FTC (1919) report, the Big Five meatpackers were compelled in 1920 to sign a perpetual consent decree with the Department of Justice. The decree required the Big Five to cease their market-pooling arrangements, to forego further consolidation in meatpacking, and to sell their stockyards, railroad equipment, refrigerated warehouses, retail meat stores, and non-meat food processing plants. The Packers Consent Decree is often cited as one of the first examples of successful antitrust policy (Aduddell and Cain 1981; Connor, *et al.* 1985). The peak of control of cattle slaughter by the Big Five was around 1918 (Figure 1). Concentration glided slowly downward for the next sixty years, reaching its nadir in the 1970s when the top four accounted for a mere 20% of national cattle slaughter (Connor 1989:80). Except for a slight rise in lamb slaughter concentration until the mid-1930s, all other red meat slaughtering also declined to historical lows between 1967 and 1977. Part of the success of the Decree may lie in the monitoring and licensing powers of the Packers and Stockyards Administration formed in 1921.

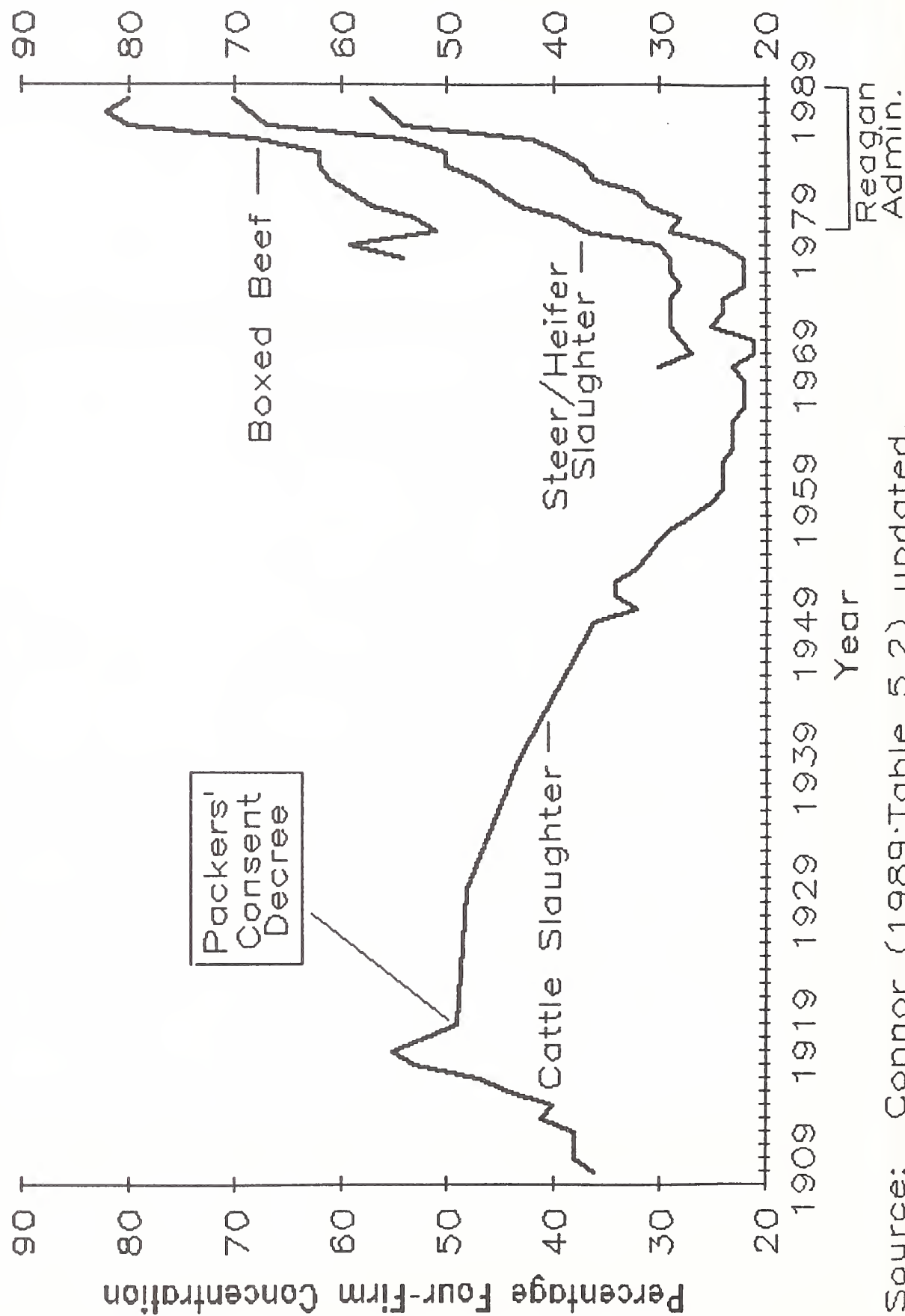
It is a strange sort of roller coaster that can climb higher on its second loop than at its start. Yet, beefpacking appears to be defying the gravity-like laws of market-structure change. Abetted by the most permissive period federal antitrust enforcement since the early 1930s, beefpacker concentration has risen to new heights. From 1977 to 1987, the top four companies' share of U.S. steer/heifer slaughter climbed from 29% to 67% (Connor 1989). This astounding 131% increase in concentration is more than twice as rapid as any other historical decennial increase in other U.S. food and beverage industries. Furthermore, much as the case a century before, the increase in business consolidation was spurred by a major technological innovation in manufacturing. First commercialized in the early 1960s, the new "boxed beef" technology became the dominant form by 1980, largely supplanting carcass beef by the late 1980s. During this period, packer margins narrowed and economies of plant scale enlarged considerably. I will argue that from its inception boxed beef was sufficiently distinct as to warrant classification as a separate market at the processing and distribution stages of the beef subsector. Boxed beefpacking is even more concentrated than beefpacking generally: about 40 firms operate boxed beef plants today (compared to more than 1,000 other beefpackers), with the top four handling 80% of production volume. Packer concentration among other red meat species has also risen since the 1970s, albeit more slowly. Many observers believe that hog slaughtering may be the next industry poised for rapid concentration increases.

### Defining the Market

As any antitrust expert knows, defining the market is half the battle in merger cases and most other kinds of antitrust trials. The question addressed in this section is whether beef is significantly different from all other meats, or indeed all other sources of calories for humans. In addition to produce scope, attention must be given to the geographic scope of the market for beef. Especially important is to consider the influence of international competition on the U.S. beef sector.

A market consists of two sides, the sellers (the industry) and the buyers (the customers or demand segments served). All sellers of the same product and all buyers of the same product are in the same market. The problem at hand is delineating what "the same" means in the context of beef. To properly delineate a market's boundary, one must examine both the selling side and buying side simultaneously.

Figure 1. Four-Firm U.S. Beefpacker Concentration, 1909 - 1989



Source: Connor (1989:Table 5.2) updated.

## Product Scope

We reviewed existing studies of the consumer demand for red meats (Huang). It was found that beef was to some degree substitutable for other high-protein foods. Pork, veal, lamb, and chicken are moderately substitutable for beef, whereas fish, eggs, dairy products, and other high-protein foods are poor substitutes. Within the beef products category, fresh (frozen or refrigerated cuts) beef is not substitutable for processed (salted or smoked) meats, even though many processed meats are wholly or partially beef in content. Similarly, beef "varietal meats" and, of course, nonedible beef by-products are considered very poor substitutes for fresh beef by consumers.

While the findings on the demand side are sensible and well documented, there is more judgment required for considering substitutability on the supply side. At the processor level, the Census Bureau places meatpacking plants (SIC 2011) in a separate industry from meat processing plants (SIC 2013). Both of these industries have high specialization (97 to 98% in recent years) and coverage (61% to 86%) ratios. For example, in 1982 meatpacking plants' shipments consisted 98% by value of meatpacking products (the specialization ratio) and 85% of all meatpacking products were made in meatpacking plants (coverage ratio).

The Packers and Stockyards Administration (P&SA) of USDA has for many years distinguished between steer-heifer and cow-bull beefpacking plants. (Veal, pork, and lamb slaughtering have also been treated separately.) Not only are these plants specialized as to equipment, but they are also geographically somewhat specialized. Cow-bull slaughter is found more widely wherever a state has dairy operations; large steer-heifer plants are found primarily in the Western Corn Belt and High Plains states. On the basis of this and other evidence, it appears that for the vast bulk of beefpacking, there is very little scope for supply substitution between cow-bull and steer-heifer slaughter. The fact that nearly all culled cow meat is sold for further processing into sausage products and little beef from younger animals (mostly tougher muscle) finds its way to sausage plants reinforces this distinction.

A more recent distinction, made in P&SA publications since the late 1970s, is the partitioning of steer-heifer slaughter into boxed beef and carcass beef. The proportion of all beef sold as boxed beef rose from 30% in 1972 to 82% in 1988. Some industry analysts expect carcass beef to practically disappear during the 1990s. The key question is whether boxed beef is a separate market from carcass beef. Both the technology of production and demand characteristics appear to support the affirmative. Although it is possible to produce boxed beef in conventional carcass plants, nearly all is made in separate "fabricating" plants that were built since 1960. In some cases, fabricating plants stand alone, relying on carcasses from slaughtering plants within 100 miles or so, while in other cases fabricating plants were built adjacent to large steer-heifer slaughtering plants that provide a large share of the carcasses needed for further processing. In either case, the type of equipment used and labor requirements imply that conversion of fabricating plants into slaughtering facilities is unlikely to be economically feasible. Asset fixity at the distribution stage of the beef subsector further reinforces the distinctiveness of boxed beef from carcass beef. The conversion of grocery stores' meatcutting facilities to boxed beef meant that the number and skills of butchers were substantially reduced; in-store carcass handling equipment was discarded; and space needed for carcass cutting was converted to other uses. Once wedded to boxed beef, retailers would find the change nearly irreversible. Thus, arguments on both the demand side and the supply side support treating boxed and carcass beef as separate industries.



## Geographic Scope

Feeder cattle are sold primarily at local markets located no more than 200 miles from the ranches on which they were raised. Fed cattle are sold primarily to order buyers from nearby meatpacking plants. The order buyers purchase 80% of their live animals on average 150 miles from the plains states meatpacking plants they represent (and only 135 miles from Midwestern plants). Therefore, the geographic boundaries for live animal sales typically extend no more than 200 miles from the point of production or processing, with the exact location and shape influenced by major transportation routes, transportation barriers such as mountain ranges, political boundaries, and centers of commerce and price information (e.g., Omaha, Denver, etc.).

Boxed beef and carcass beef is sold essentially on a national basis to food stores and meat wholesalers, though the Rocky Mountains create a semi-permeable barrier to east-west trading of fresh and frozen beef. The boundaries of the beef export market are supranational.

## International Trade

To this point, the U.S. beef industry has been discussed as though it were isolated from the rest of the world. However, both international trade and international direct investment can alter the geographic boundaries of markets.

Imports of fresh and frozen beef have ranged from 5% to 9% of the U.S. supply of beef since the early 1970s (Connor 1988:Appendix Table A-14). There is no upward trend in imports. These imports often consist of canned or frozen grass-fed beef that may not compete directly with the fresh grain-fed beef used in boxed beef. Beef imports are effectively limited by voluntary export agreements, tariffs, and sometimes quotas (Johnson, *et al.* 1989). So long as U.S. protectionism continues, domestic competition is hardly affected by import competition.

Much of the exports of beef from the U.S. consists of variety meats and pet food ingredients, products that do not compete with grain-fed boxed beef. The amount of beef exported from the U.S. is large (\$1,205 million in 1988), but at most 3% of the value of beef shipped from U.S. plants has been exported in the 1980s (Connor 1988:Appendix Table A-15; USDA 1989). The export ratio has risen from about 1% in 1970-1972. Therefore, the likely impact of exports on domestic competition and concentration may be dismissed as negligible so long as protectionist policies of importing countries remain in place.

## International Investment

A major development since World War II has been the accelerating foreign direct investment involving the U.S. economy. Quantitatively, foreign investment has become a greater source of economic internationalization than trade. Foreign investment has the potential for altering the strategic conduct of firms and, hence, the competitive performance of industries.

Let us first examine foreign investment abroad by U.S.-owned firms -- so-called outward investment. The first large-scale food processing investments abroad were undertaken by the leading U.S. meatpackers. Beginning in 1907, the big meatpackers made substantial investments in Argentina, Brazil, Uruguay, Paraguay, Australia, and New Zealand (Horst 1974), mainly to serve the U.K. export trade. By 1915 Swift had 15% of its assets abroad. In 1988 (the latest, preliminary data available) U.S. companies owned 17,000 foreign affiliates (subsidiaries or joint ventures) which employed over 6 million people. U.S. multinationals had only 24 meat processing affiliates abroad in 1986, with total assets of \$1.2 billion and sales of \$2.5 billion. U.S.



meatpacking and meat processing firms derive less than 4% of their total sales from plants located abroad, a far smaller proportion than the rest of food manufacturing (15%). Therefore, on the basis of both export sales (3%) and other overseas sales (4%), the degree of internationalization for U.S. meat companies is relatively small and has likely declined since the earlier part of this century.

Of somewhat more popular concern is the rapid rate at which U.S. assets have been purchased by foreign investors. Several spectacularly large takeovers of large U.S. food manufacturing companies have occurred during the last decade (Carnation by Nestle, Pillsbury by Grand Metropolitan, and others). Accomplished almost entirely by merger, foreign entry has pushed up the value of their investments in U.S. food processing by a breathtaking 25% per year the ten years from 1979 to 1989. In 1989 there were 161 foreign-owned food processing affiliates with \$30 billion in total assets, \$30 billion in sales, and 169,000 employees. Most of the affiliates were engaged in the manufacture of highly processed consumer packaged foods and beverages. Meat processing affiliates were a small portion of the total, only 17 in number, with \$0.3 billion in assets, \$1.7 billion in sales, and 7,100 employees. Unlike other areas of food manufacturing, foreign-owned meat processors are contracting; for example, employment since 1980 has shrunk by 80%.

Most inward investment originates from Europe, Canada, and Japan. In the U.S. food processing industries, almost all foreign investment was from Europe (60% of total assets in the 1980s) and Canada (33%). The dollar value of Japanese ownership in U.S. food processing rose slightly in the 1980s, but its share of the total fell from 4% in 1980 to 2% in 1989. Ownership of U.S. meat processors by Japanese investors is similarly modest, about 5 to 6% of all foreign investment in U.S. meat companies (compared to over 80% by European investors), amounting to about \$25 million in total assets today (less than 1% of the industry total).

There is little evidence that foreign investors follow maverick business strategies. Foreign investors generally play by the local rules, blend in with their domestic competitors, and do little to shake the boat. Japanese investors would appear to be imitating this pattern. Their primary interest in the U.S. is in ensuring a supply of grains, oilseeds, and meat for the Japanese market. Their foreign investment has been primarily in agricultural products wholesaling (\$3 billion in U.S. assets generating \$8 billion in U.S. exports) rather than food processing.

### Summary

The proper delineation of a market requires an examination of the demand for a product (consumer behavior), supply of a product (production side), and geographic scope. Studies of U.S. household purchasing behavior confirm that beef in fresh or frozen form is a distinct product. Furthermore, consideration of the technology of meatpacking production and distribution leads to the conclusion that boxed beef has become a separate industry from carcass beef. In terms of geographic scope, beef cattle markets are quite localized. In the principal area of the U.S. for fattening cattle (west of the Mississippi plus the Eastern Corn Belt), fed cattle are bought by beefpackers in approximately 15 distinct markets. However, boxed beef and carcass beef are sold into what is essentially a national market (except for about 3% of the value of U.S. beefpacker shipments sold in international markets). Neither imports nor foreign direct investment have broken down the U.S. border as a boundary for domestic sales of beef.

## Market Concentration

There are several indexes of size inequality used in market structure analyses. A statistic that provides a useful industry wide indicator of seller concentration is the four-firm concentration ratio (CR4), which is simply the sum of the market shares of the four leading firms in a market. The various concentration measures we will examine are useful as indicators of market structure categories. As numbers of firms approach one and market shares or CR4 approach 100%, the market is evolving into a structural monopoly. However, concentration is not proof of monopolistic behavior or performance. That is, high concentration only a necessary condition of monopolistic pricing; it is not a sufficient condition of monopolistic pricing. It is possible that a monopolist might act in the interest of consumers or suppliers and price at competitive levels. It must be recognized that such a "good monopoly" would be sacrificing returns to its owners by doing so.

Between the extremes of atomism and monopoly lie structural oligopolies -- industries with "small" numbers of sellers and "high" concentration. Oligopoly theory is much more complicated than either perfect competition or monopoly. Yet, most oligopoly models predict that the higher the degree of concentration, the closer the price to the monopoly price. Considerable statistical evidence and market experiments support the general finding that with up to three or four sellers or with CR4 above 40% to 60%, supranormal profits or supranormal prices are generated.

### Meatpacker Concentration

In 1920, the four leading meatpackers shared 46% of the U.S. market for red meats (Yeager 1981:243). Cattle and hog slaughter by the Big Five meat-packers reach their maximums around 1918 at 55% and 45%, respectively (Nicholls 1941). This was the height of control by the Beef Trust. Except for a slight rise in sheep slaughter the mid 1930s, national concentration declined in meatpacking thereafter. From 41% in 1947, four-firm sales concentration in meatpacking reached its nadir in 1977 at 19%. Concentration in beef, veal, and pork packing all reached historical lows in the 1967-1977 period.

Bureau of the Census data show that national CR4 in beefpacking reached a low point of 25% in 1977 and then rose to 44% in 1982 (the latest year available). I estimate that beefpacking CR4 rose to 74% in 1987. However, because several large beef fabricating plants are classified as wholesaling operations, the Census of Manufacturers data increasingly understate the true level of sales concentration in meatpacking. Nevertheless, a 72% increase in CR4 in ten years (1972-1982) is very large by historical standards. That CR4 in beefpacking probably tripled between 1977 and 1987 is simply outside the realm of experience.

P&SA data on concentration of animals slaughtered is a useful substitute for sales concentration. These data include fabricating as well as slaughtering plants, but they may understate concentration if the leading packers purchase higher-yield animals or sell meat at a higher unit price than smaller firms. National four-firm concentration (CR4) for steer/heifer slaughter was 28-29% from 1972 to 1977. From 1977 to 1987 it rose from 29% to 67%, an increase of 131%. Such an increase in CR4 is completely unprecedented in this century. The next highest decennial increase in CR4 that can be found in the food processing industries is beer (SIC 2082), which rose from 51% in 1972 to 79% in 1982, a 54% increase (however, if one goes back to 1954, beer concentration rose by 204% in 28 years). Concentration of culled cow-bull slaughter has varied from 9% to 20% since 1969.

As was argued above, the appearance of boxed beef in the 1960s created a new industry segment within beefpacking. Prior to 1960 virtually all of the sales of beefpackers were in carcass form, that is, partially trimmed sides or quarters of refrigerated beef. Carcass sales required grocery retailers to have central meatcutting plants or extensive, expert in-store butchering. Boxed beef eliminates a great deal of the retailer preparation of beef, and the heavy plastic packaging facilitates the removal of oxygen thereby extending shelf life by several days. Boxed beef sales accounted for 31% of all beef sales in 1972 and is now more than 80%. The degree of concentration is markedly higher in boxed beefpacking than in steer/heifer slaughtering. The boxed beefpacking CR4 rose from 54% in 1977 to more than 80% today. IBP, ConAgra, and Cargill/Excel today account for about 75% to 80% of the boxed beef market.

It is important to note that the market shares of the Big Three meatpackers are fairly close today. During the period of rapid growth of boxed beef sales in the 1970s, IBP held a distinct market-share lead, but the ranks and shares of all the other leading firms changed rapidly. Rapid growth, market share instability, and the entry of new sellers are all factors that discourage cooperation in selling prices of beef. Most industry observers are convinced that the Big Three are intensive rivals on the selling side of their operations; each has been willing to use price cutting to maintain or increase its market share. The failure of IBP to gain a dominant market position in boxed beefpacking (say, a market share of 40% or higher), has so far kept price leadership patterns from developing (such as was seen historically in the steel and cigarette industries).

However, the appearance of significant excess capacity in fabricated beef facilities in the 1980s implies that the threat of entry by new competitors is much diminished. Several beef fabricating plants are operating on single shifts presently; conversion to double shifts could be effected quickly and would significantly lower costs of production. Without some distinct technological advantage, a would-be entrant will judge entry today to be more risky than formerly when plant capacities are more fully utilized. Moreover, much slower growth in boxed beef is anticipated in the future, both because of consumer demand conditions and because the shift from carcass to boxed beef is nearly complete. Finally, while in the 1970s wholesaler-buyer concentration was as high or higher than beefpacker concentration by the late 1980s the situation was reversed. For all these reasons, market conditions today lend themselves to greater cooperation in selling prices than has been possible since the early 1920s. Significantly, should further mergers take place involving the Big Three, especially a merger of two of them, conditions would be ripe for price leadership to develop in beef selling.

When does CR4 reach a level that is "too high," that is, a critical level above which monopoly pricing is feasible or likely? This is a much debated question in economics, and the answer depends on a number of factors besides mere seller concentration levels. For example, blockaded entry, homogeneous commodities, equal access of the leading firms to the same technology of production, relatively low buyer concentration, and slow or declining industry growth are all factors that facilitate pricing collusion or cartel-like behavior. Given these conditions, numerous studies of the food manufacturing and other manufacturing industries strongly suggest that the critical level of four-firm concentration lies between 40% and 60%. By the time CR4 reaches 80%, pricing can usually be maintained at monopoly levels. It appears that beefpacking has recently passed beyond the critical threshold level of seller concentration. Moreover, the other market conditions necessary for monopolistic pricing to develop are largely satisfied in the beefpacking industry of the late 1980s. (These are necessary, not sufficient conditions, for the potential members of a cartel may still refuse to join despite the profit potential for doing so).



## Buyer Concentration of Meatpackers

Beef marketing is essentially national in scope for the leading firms, but meatpacker procurement is far more localized. Most hogs and cattle are purchased within 100 miles of the slaughter plant to avoid dehydration and shrinkage and to ensure "just-in-time" delivery. Ward (1988) found that 80% of cattle were slaughtered within 150 miles of packing plants in the Plains States and 135 miles of Midwestern packing plants. Marion, *et al.* (1989) and Quail, *et al.* (1986) identified 13 cattle procurement regions for the 25 U.S. states west of the Mississippi but including the Eastern Corn Belt. For example, the Denver region includes Colorado and the western half of Nebraska. In these 13 regions, average four-firm buyer concentration (BCR4) was just under 50% in 1971, rose slowly to 57% in 1978, and jumped to 82% in 1986; the beefpacking mergers of 1987 have likely raised averaged BCR4 to 90%.

Ward (1988) found some cattle procurement studies that identified significantly smaller buying regions. For example, he identified southwest Kansas, the Oklahoma panhandle, the Texas North Plains, and the Texas South Plains as four separate buying regions. However, Quail, *et al.*, considered this to be one beef procurement market centered on Amarillo. While most authors consider state boundaries too small on average, P&SA data on BCR4 in each state are published regularly. In 1985, the 10 leading steer/heifer states had BCR4s ranging from a low of 72.3% (Nebraska) to 99.9% (Colorado).

## Meat Wholesaler Concentration

The question to be addressed here is the degree of buyer concentration faced by beefpackers when they sell carcass beef or boxed beef to distributors. If meat wholesaler concentration is high, then the potential power over selling prices for beef cannot be easily exercised by beefpackers. That is, the bargaining power of meat wholesalers may act as a countervailing force when the leading beefpackers attempt to raise selling prices above competitive levels. This is the same argument often used in justifying the concerted activities of farmer bargaining cooperatives where processor concentration is high.

Beef sold to consumers in grocery stores is distributed through two wholesale channels. The largest portion is purchased by employees or agents of the major U.S. grocery chains or grocery stores affiliated with cooperative or voluntary wholesaler organizations. These retailer buyers may negotiate purchases for all the regions in which the chain operates, but a more typical pattern is for purchasing to be delegated to a divisional meat buyer. Retailer "divisions" correspond to a major metropolitan area and the surrounding region served by the retailer's warehouse. Typical divisions are Northern California (centered in San Francisco), Chicago (including portions of Wisconsin, Illinois, and Indiana), and Washington-Baltimore. A minor portion of beef is sold through independent grocery stores or chains too small to own their own wholesale distribution facilities. In this case, retailers purchase their beef from specialty meat wholesalers which operate in regions that correspond closely to the retail-chain divisions just described. Thus, beef sold in grocery stores is mainly sold at wholesale in approximately 40 to 60 geographic regions of the United States.

How concentrated are wholesale buyers in these regions? Nationally, grocery store sales are not highly concentrated. The top 20 grocery store chains account for 35% to 40% of sales today, which is about double the share they held in 1948 (Marion, *et al.* 1986:332, excluding A & P). However, when measured at the more appropriate metropolitan-area level, four-firm concentration (CR4) in the 54 largest city markets averages about 61% (projected from Marion, *et al.* 1986:307 and Cotterill 1989). In 1958 the CR4 in the 54 largest U.S. metropolitan areas was only 48%.



Thus, within major U.S. cities, grocery sales concentration increased almost 30% in the last 30 years.

Somewhat less information is available about specialty meat wholesaler concentration. About the only reliable source is a USDA study of grocery wholesaler concentration conducted in the early 1970s for 14 appropriate geographic regions of the United States. General-line wholesalers' CR4 averaged 73% in the 14 markets, but this type of wholesaler handles little refrigerated beef. The CR4 for specialty meat wholesalers averaged about 33%; numerous mergers in grocery wholesaling since then may have raised CR4 to around 40% today.

In summary, beefpacker salespersons face moderate to high levels of wholesale-meat-buyer concentration when attempting to sell carcass or boxed beef. On average, the top four grocery chains purchase 55% to 60% of the beef sold directly to integrated retailer-wholesalers. Of the beef sold through the separate distribution channel serving nonintegrated grocery stores, the four largest buyers command about 40% of sales. These levels of buyer concentration are high enough to provide significant, if not overwhelming, countervailing power against the tendency of leading packers to raise beef prices. However, if beefpacker seller concentration were to rise much farther above present levels, the countervailing power of wholesalers will count for little.

### Economies of Scale and Other Barriers to Entry

Entry barriers are necessary for market power to be maintained in the long run. Without barriers, entry will increase the numbers of sellers to the point that cooperative pricing or output decisions becomes infeasible. As product differentiation is unimportant for fresh beef, the major potential entry barriers appear to be technical ones.

The principal stage of the beef subsector where economies of scale are most prevalent is in beefpacking (Marion 1988, Ward 1988). A specialized steer/heifer packing plant with a capacity of 250,000 head per year exhausts most economies of scale (reaches minimum optimal scale). Economies of scale are greater in boxed beef fabricating plants -- probably between 500,000 and 1,000,000 head per year. Thus, an integrated slaughtering-fabricating plant would utilize 2% to 4% of the U.S. fed cattle supply. Optimal size meatpacking plants built in the 1950s accounted for only 0.1% to 0.9% of national supply (Connor, *et al.* 1985:154).

From the point of view of procurement, a single, optimally sized, integrated slaughtering-fabricating plant represents 20% of the cattle supply or more in 10 of 13 major cattle regions (Marion 1988). Thus, four such plants could soak up 80% of the total supply of steers and heifers. Since the late 1970s, excess capacity has been widespread in the beefpacking industry. Leading beefpackers have large, modern plants ready to come into production at short notice. This may well have discouraged entry by new firms. There is a substantial body of theory that shows that excess capacity maintained for strategic (entry-forestalling) purposes can be as effective or more effective in preventing entry than limit-pricing strategies.

Absolute capital barriers into beefpacking are formidable. A new integrated slaughter-fabricating plant of 500,000 capacity costs \$20 to \$40 million (Marion 1988). Of course, by comparison with many other industries (automobiles, beer, corn fructose) where optimal plants today cost around \$500 million, absolute capital size in beefpacking is modest. Generally, large absolute investment sizes are not significant barriers unless the major established packers can borrow capital at preferred rates compared to smaller firms or potential entrants. IBP and Excel, which are parts of much larger entities, may well have superior borrowing positions because of their parent companies' cash flow or financial reputations.

Economies of scale have often been identified as sources of increased concentration. The theory is that scale economies that increase faster than industry sales force smaller firms (mainly owners of smaller single plants) to exit because their higher unit costs cause them to become non-competitive in pricing. There is little empirical evidence that supports this theory in the case of the food manufacturing or general manufacturing.

Neither plant nor multiplant economies of scale justify the high observed levels of concentration in beefpacking today. If each of the top four meatpackers owned one optimal-size boxed-beef plant, CR4 would be at most 16%; assuming that three plants (the upper estimate from studies of three other food processing industries) would exhaust all multiplant economies, CR4 would be in the 24% to 48% range. Thus, plant and multiplant economies of scale can account for at most half of the increase in beefpacker concentration observed since the mid 1970s. Moreover, the wage advantages once enjoyed by IBP have spread through union give-backs to most of the other boxed beef packers.

Mergers have played a decisive role in increasing concentration in beef-packing. In summary, around 60% to 70% of the beefpacking capacity of the Big Three today was bought rather than built. There is no evidence that food industry mergers have been accompanied by post-merger efficiency increases (Connor and Geithman 1988).

### Market Structure and Market Power

#### Meatpacker Procurement

Market structure conditions lend themselves to monopsony pricing by meatpackers, at least sporadically and in some procurement markets, if not all. Moreover, there is a surprising consensus among the empirical studies that have examined the relationship of fed cattle prices to levels of concentration.

Most fed cattle are purchased by beefpackers or their agents within 100 miles of the beef-packing plant to which the cattle are shipped. Bids and offers are typically made at feedlots after personal inspection of the cattle in a pen. With sufficient numbers of bidders and balanced information, in general direct trading methods result in moderately accurate price efficiency and equitable prices. However, when buyers are as few as two or three and when buyers have significantly more information than sellers, prices are likely to be below competitive levels. There is an income transfer from producers to packers (Marion, et al. 1986:99).

A study by Ward (1988) explained variation in 334 observations of July 1979 fed cattle prices (on a liveweight basis) collected from 31 feedlots or marketing agents. The key result of interest is that each additional buyer raised the price of fed cattle by 22 to 28 cents per hundred-weight, all other things held equal. Comparing the most concentrated with the least concentrated procurement markets, Ward's results indicate that 1979 fed cattle prices were depressed by \$1.30 to \$1.70 per cwt. by buyer concentration. Based on average 1979 Omaha choice steers price of \$67.67 per hundredweight, cattle prices were reduced by at most 1.9 to 2.5%.

Menkhaus, et al. (1981) also studied the impact of beefpacker concentration on fed cattle prices. Annual data on the average price of choice grade slaughter steers were collected in 12 states for the year 1972 and 15 states for the year 1977. In both years, CR4 was found to be significantly negatively related to fed cattle prices (controlling for state slaughter surplus or deficit, meatcutters' wages, choice grade steer carcass prices, and average feedlot size). The range on CR4 across the states was about 30 percentage points, so based on average Omaha choice steer

prices, fed cattle prices were depressed by at most 1.2% in 1972 and by 1.6% in 1977. These estimates are slightly lower than Ward's. States may be too small to accurately reflect the boundaries of cattle procurement markets.

Marion, et al. (1990) examined annual average fed cattle prices in 13 regional markets covering 25 states for the years 1971 to 1988. They also found that regional beefpacker concentration had a significant negative influence on prices paid to cattlemen up to about 1980. Comparing prices for the range in CR4, cattle prices for 1976-80 were reduced by 1.7% because of buyer concentration. Marion, et al. were able to control for several other factors likely to affect cattle prices.

To summarize, buyer concentration has had significant depressing effect on fed cattle prices and, therefore, on cattle supplies. Considering their diverse time periods, data sources, and methods of analysis, the three studies surveyed are remarkably consistent in their findings. In all three studies, fed cattle prices were from 1.2% to 2.5% lower each year in the most concentrated cattle procurement regions compared to the most competitive regions. However, under the average concentration conditions prevailing in the 1970s, cattle prices were about 0.5% to 1.0% lower than they would have been under perfectly competitive conditions. It may also be noted that nine other statistical studies reviewed by Ward (1988:166-170) found that buyer concentration was inversely related to the prices of hogs and slaughter lambs. Three of these found that there was a significant decline in hog prices in the area surrounding a recently closed porkpacking plant; the price effects lasted for several weeks at least.

#### Selling Prices of Meatpackers

Assuming that meatpackers want to maximize profits, there are several ways of doing it. Lowering prices paid for major inputs such as slaughter animals is one tactic. Raising selling prices is another. Both pricing strategies would cause packer margins to widen. (Stimulating sales or productivity changes while holding output prices steady are other strategies for increasing total profits). By "raising" selling price we mean relative to what the price would be under perfect competition, not necessarily raising real prices over time.

There are no published studies that focus exclusively on the relationship of beef or meat prices to meatpacker concentration. However, there are a number of studies that have included meatpackers or the meatpacking industry among a broader sample of food processing companies and industries. Such studies were reviewed in Connor, et al. (1985:Chapter 7). From the estimated relationships it is possible to predict whether supranormal product pricing is expected given the structured configuration of the industry at hand. In the cases of beefpacking and meatpacking, virtually no monopolistic overcharge was found from a sample of 1976 processed food prices. (Meat processing, on the other hand, had an expected price elevation due to market power of from 1.0 to 1.3%).

Unfortunately, these predictions are based on the structure of the meatpacking industry as it was in the mid 1970s, a period when concentration was near its lowest level in history and entry was easy. It is difficult to believe that the higher levels of concentration and barriers to entry seen today (levels considerably higher than the buyer concentration of meat distributors) would not cause some price elevation. Similarly, should fresh beef become as differentiated as bacon and sausage are today, one might expect price elevations to consumers that are similar to the meat processing industry in the 1970s (U.S. House of Representatives 1980).



### Meatpacker Margins

The margins generated by meatpackers are the differences between the selling prices of meat and the buying prices (costs) of inputs purchased from other enterprises. If input and product markets are highly competitive, then employees earn wages consistent with their skill levels (return to human capital) and investors earn a long-run return on investment consistent with business risk in the industry (a risk-adjusted normal rate of return). If, on the other hand, market power is being exercised in either the input markets (e.g., labor unions or cattle markets) or product markets, then wages or profits may be at supracompetitive levels. It is paradoxical that beefpacker margins have fallen during the same period that their market power on the buying side (and probably the selling side as well) has increased. The explanation for this apparent inconsistency is that some components of beefpacker margins shrank while one or more other components did not.

Profit margins (pre-tax) of beefpackers are generally less than 2% of sales, which means that profits account for, at most, one-third of the farm-to-carass spread, and perhaps as little as 3% in some years. Thus, even a doubling of profit rates would increase the spread only slightly. The effects of labor costs, economies of scale, and productivity changes on the spread very likely overwhelm the opposing changes in the spread engendered by rising profits.

### Meatpacker Returns

After-tax returns for meatpackers average about 1% on sales, but for comparison with other industries those returns should be related to stockholders' equity (invested capital). From 1974 to 1985, meatpackers had returns averaging 11.0% (according to the American Meat Institute) or 14.4% (*Forbes* magazine compilation). Beefpackers' profits rates have been historically 40% to 50% higher than hogpackers, so by projection 1974-85 beefpacker profits as reported to AMI averaged about 16.1%. Beefpackers' profits were about the same as other food processors in that period, but are significantly higher than the rest of manufacturing (Connor 1988). In the 1960s and early 1970s, meatpacker profits were significantly lower than other food manufacturers (U.S. National Commission on Food Marketing 1966).

Thus, the evidence of market power on the selling side of the beefpackers operations is mixed at best. Solid evidence from the 1970s points to a contribution of 0.2 to 0.4 percentage points to sales margins from the buying power of beefpackers. That is, in the late 1970s the after-tax profits of beefpackers would have been one-quarter to one-third lower if beefpackers had been fully price competitive. Changes in market structure since then suggest that the monopoly rents of beefpackers may be a higher proportion of accounting profits today.

### Competition Policy

There are many ways for societies to assert social control over domestic markets that are experiencing "market failure." Laissez-faire policies are predicated on the belief that markets are reasonably competitive. If concentration is low and market entry is easy in a homogeneous product market, competition among sellers produces socially optimal results -- maximum production at the lowest possible price. Since 1980, federal antitrust and regulatory enforcement has been minimal (Connor, *et al.* 1985). Indeed, a significant degree of deregulation has occurred during the last decade, with a marked slowing in the late 1980s. The present presidential administration has given few hints as to its future regulatory or antitrust initiatives.

During the 1980s only overt price conspiracies (cartels) were strictly enforced. Laws covering price discrimination (including predatory pricing), mergers, monopolizing markets, consumer pro-



tection, and other restraints on trade are in abeyance. If these policies were to continue, there is little doubt that concentration would rise further, fueled primarily by mergers. More assiduous enforcement of existing antitrust provisions or clarification of enforcement procedures by the Congress would have its greatest impact on halting proposed future mergers. For example, the authorities might halt horizontal mergers involving packers with at least a 5% market share. Similar standards could be applied to the buying side as well as the selling side of beefpackers' operations. The present structure would be frozen, as historically the courts have been reluctant to dissolve already merged firms.

In addition to stricter merger enforcement, Congressional direction is needed in at least three other areas: private antitrust suits, conglomerate firm strategies, and price discrimination. In the well known Illinois Brick case, the Supreme Court decided that parties indirectly injured by price-fixing conspiracies had no standing in the federal courts. Yet, a 1989 decision by the Court has let stand state laws that would permit, for example, cattlemen to sue retailers who fixed meat prices. It appears that the Court is ready to accept as constitutional Congressional efforts to give standing to indirectly injured parties in antitrust suits. Second, clarification is needed concerning conglomerate firms' conduct. There are virtually no restraints on conglomerate mergers under present laws. The practice of many conglomerates of using profits from one line of business (for example, petroleum or processed meats) to subsidize long-term losses in another line (for example, below cost pricing to gain market share in beefpacking) probably is legal, despite the negative effect it can have on industry structures. Finally, Congressional direction is needed to develop standards for the application of the Robinson-Patman Act which prohibits anticompetitive price discrimination. The Act has fallen into virtual disuse at the federal level for several years.

The "deregulation" movement of the 1980s appears to have run out of steam. There seems to be greater political will to impose constraints on business behavior in areas like food safety and quality, ingredient and nutrition labeling, consumer protection, expanded use of mandatory business information disclosure, and reduced legal protection of trademarks and trade names (see Connor, et al. 1985:379-391). The effect of most of these initiatives would be to make accurate information more widely available for consumers, stockholders, and competing sellers. Data on profitability of SEC-regulated packers and other firms in the beef subsector, by line of business (beef, veal, pork, etc.) would provide guides to investment, including signals to new firms to enter high-profit lines of business. Foreign-owned and privately owned firms above a certain size could be required to file abbreviated public reports on their financial performance. Renewed consideration of grades, standards, and labeling would reduce the scope for product differentiation and attendant nonprice competition. Misleading use of vague terms ("organic," "natural," and "light") cause confusion among consumers; there is an implied disparagement of products not carrying such identifiers. Trade regulation rules could be developed to ensure that the terms convey meaningful quality information to buyers.

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"Note: References available from author upon request.

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## MEAT INDUSTRY COMPETITION & CONSOLIDATION IN THE 1990s

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Thank you. I'm glad to have been invited to share with you my perspectives on industry competition, consolidation and prospects for the future. For the purposes of this discussion, most of my remarks will focus on the beefpacking industry, where consolidation and competition have received the most attention.

### CONSOLIDATION

During the past 15 years, various governmental and non-governmental groups have examined the beefpacking industry's consolidation. In 1987, both Bill Jones, then head of the Packers & Stockyards Administration (PSA), and the U.S. Government Accounting Office (GAO) in its report on the Purpose, Use, Impact and Regulation of Cattle Futures Markets concluded that there was no evidence that prices and market supply have been affected adversely by consolidation or by increased use of futures markets. They cautioned, however, that consolidation does increase the potential for prices and markets to be affected. A 1989 National Cattlemen's Association study done by independent economists, including my distinguished co-panelist, reached similar conclusions about packing-industry consolidation.

Even more recently, in testimony October 16, 1990, before a hearing of the House Subcommittee on Government Operations, Justice Department Antitrust Division Deputy Attorney General Judy Whalley said the division has not found past industry mergers anticompetitive and that the risk of anticompetitive behavior in meat packing currently does not appear to exist. Whalley noted that the division would carefully review any further mergers.

At the same hearing, Packers and Stockyards Administrator Virgil M. Rosendale testified that a PSA review of packer consolidation found no evidence of noncompetitive behavior in meatpacking.

From Excel's perspective, competition has never been more intense than it is today. As Bill Jones noted for PSA, profit margins in packing had not changed significantly in the 10 years leading up to 1987. At that time, gross margins had remained between 1-2 percent, which is a level of return that is extremely competitive. I can assure you from personal experience that nothing has occurred since 1987 to improve packer margins in either beef or pork processing.

That perspective is supported by the facts in Professor Clement Ward's 1988 book "Meatpacking Competition and Pricing," which confirmed the lackluster margins of profit for meatpackers. His book noted that Forbes magazine reported a median net profit margin for meatpacking of 1.6 percent compared to 3.9 percent for an all-industry median profit margin. That was sufficient profit to rank meatpacking 77th among the 87 subgroups and industries included in the Forbes survey.

In the same Forbes survey, the average return on equity for meatpackers was 11.9 percent compared with a median of 12.6 percent for all 87 subgroups and industries. That placed meatpacking 65th among the 87 categories.

Other industry observers have pegged net profit margins within the beef packing sub-section as consistently below 1 percent throughout the 1980s.

Professor Ward has been among the most consistent and prolific observers of the packing industry. He, like the other analysts mentioned above, is concerned about the four-firm consolidation level within beefpacking but says that so far the evidence shows that the trend is the result of economic realities and has benefited both cattle producers and beef consumers.

A study Ward co-authored earlier this year with Professor Conner concluded that the meatpacking industry is not earning excessive profits, either in absolute terms or relative to other food processing industries.

Dr. Wayne Purcell, director of the Research Institute on Livestock Pricing at Virginia Tech, agrees with most of Ward's assessments on consolidation, but is an even stronger advocate of its positive aspects. Purcell currently reports that with beef demand on a downward slide during the 1980s packer costs increased, but were not passed on to consumers or back to producers. I quote him here: "Middlemen packer/processors were able to grab efficiency, new technology, get bigger and get cheaper to offset a substantial part of the inflationary pressures on their costs. Had that not occurred, the pressure on cattle prices would have been even greater, the herd today would be smaller than it is and beef's market share would be smaller than it is today."

Purcell observed that the actual farm-retail price spread for beef reported by USDA was 86 cents in 1979 and \$1.07 in 1988. If that 86 cents was inflated like the consumer price index, the spread in 1988 would have been \$1.38. He concluded that if middlemen had not become more efficient, the downward pressure on cattle prices would have been much more intense.

The bottom line of all this is that packers who incorporate new technologies realize economies of scale as they grow and create a much more competitive and efficient meatpacking industry. Producers growing ever smaller supplies of cattle currently are paid more than otherwise would be possible. At the same time, consumers are receiving more varied, wholesome and higher-quality beef products at prices that are more reasonable than would be possible without the packer investments that updated and consolidated the industry.



While I'm talking about benefits, I can't pass up the opportunity to note several additional positive aspects of consolidation. Those studying the beef packing industry seldom mention that major packers have made tremendous investments in ergonomics, employee health and safety measures, food safety and upgrading the work environment. In the process of modernizing plants to ensure future competitiveness, major packers have set standards of practice that the rest of the industry is challenged to match.

For the two fiscal years beginning in June 1989 and ending in May 1991, the top three packers have designated almost 500 million dollars in capital expenditures to upgrade, expand or build newer, better facilities. That translates into designs that include more sanitary beef and pork plants that safeguard workers' health, provide Hazard Control & Critical Analysis (HACCP) monitoring and corrective action and which more completely and responsibly handle environmental concerns associated with byproducts and waste water.

At Excel, we've begun an unprecedented, voluntary ergonomics program in conjunction with the United Food & Commercial Workers Union. That program applies to all Excel plants and was begun without pressure from any outside agency. In the area of food safety, we are making major investments in improved sanitation controls and practices to further assure consistent high quality of beef and pork leaving our plants. And, in recognition of the growing tight supply of good employees, we have begun expanded training and career development programs aimed at retaining employees in an industry that is well known for its high turnover.

Instead of focusing on packer consolidation, the beef industry would be better off focusing on these improvements and seeking new ways of making red meats more competitive with poultry. That was a major conclusion reached by Dr. Conner and his associates in the study done for the National Cattlemen's Association Task Force on Industry Structure.

## COMPETITION

The NCA Task Force study called for renewed commitments to research that will lower production costs. The report said that beef seriously trails the pork and poultry industries in production efficiencies, processing and retailing. Vertical integration will not occur to any significant degree in beef or pork as it has in the poultry industry. However, the red-meat industry must develop a model of structural efficiency that all aspects of the industry can work on together to establish programs that will improve efficiency. Checkoff funds for advertising will do little to increase consumption until beef prices and products become more competitive.

Dr. Conner has or will cover those points better than I can. I do want to emphasize, however, that I concur with the study's conclusion that price competitiveness has been the overriding factor influencing beef's share of consumer dollars. While some have attributed loss of market to dietary and health factors, we know from the NCA study that only 2-3 percent of consumption loss is directly attributable to those factors.

The NCA Task Force report also stressed the importance of research into and development of more accurate price-discovery mechanisms and international export markets. Those recommendations point the way to future growth in beef consumption. A significant factor in cutting production costs and providing products consumers tell us they want would be to eliminate production of excess carcass fat.



One result of the Industry Structure Task Force was formation of the NCA Value Based Marketing Task Force. That group examined ways to put action some important production cost recommendations made by Dr. Conner's group.

I think one of the most important goals expressed by the Value Based Marketing Task Force was the need for "improving production efficiency by reducing excess trimmable fat by 20 percent and increasing lean production by 6 percent by 1995, while maintaining the eating qualities of beef." Task force calculations showed that the beef-production industry currently is spending about 2 billion dollars to produce waste fat that must be trimmed off at the packing plant or at the retail meat department. That amounts to about \$170 per head in excess production costs.

But the real goals of the task force are more far-reaching than a short-term gain in lean-to-fat ratio. Consumers told our industry in 1986 that they wanted beef cuts trimmed more closely of exterior fat. The problem has been that retailers have continued to buy beef on the same old basis, simply trimming fat and throwing it away as a cost of doing business. The Task force recommended a retailer-education program that is scheduled to begin yet this year. In a nutshell, the program to reduce fat consists of eight points that emphasize retailer and producer education and incorporate new price-discovery mechanisms. Those points are:

- Communicate Value—educate retailers about the value of pre-trimmed beef so anti-fat signals will go to packers.

- Offer Trimmed Beef—packers are to offer retailers pre-trimmed beef as an option, so the anti-fat signal goes back to feeders.

- Develop New Packaging—solve packaging problems so fat can be reduced via case-ready products.

- Define Consumer Needs—research consumer needs further to give cattlemen guidance on how to gear production.

- Research Grades—determine if there is an alternative to the degree of emphasis placed on the Choice beef grade.

- Develop Electronic Grading—make grading more objective to increase rail selling by producers.

- Carcass Value Pricing—enhance the flow of information on carcass value to promote the trimming of fat genetically.

- Develop Breed Carcass Profiles—breeders need tools for finding seedstock able to transmit superior carcass characteristics.

Industry trade publications have dubbed these recommendations a "Declaration of War on Fat." I believe that is accurate, and they certainly are positive steps toward taking action on the production competitiveness of the beef industry. Following this eight-step strategy will set the tone for future competitiveness.

I'd like to spend the remainder of my time addressing prospects for the future.

## THE FUTURE

The NCA Task Force study suggested that export markets represent a great area of growth potential and that is certainly true. I'll review that situation in a few moments. However, I believe the beef industry and red meat industries in general must concentrate first on market economies that are highly developed. The most highly developed and well-to-do population is here in the United States. Programs and products must be developed cooperatively by all segments of the beef industry.

Often individual segments respond by saying, "That's not my job, I grow the cattle, the packer and retailer have to market them." However, it is their product and livelihood at risk. I believe our industry is doing a better job of cooperating to market beef today than it was five or 10 years ago, but we have miles to go to catch up to the poultry industry.

Per-capita beef consumption in retail cuts was 68.9 pounds in 1989, down from 72.3 pounds in 1988. That's down from the high of 88.9 pounds in 1976. Consumption is a factor in demand, but more importantly it's a measure of supply because what is produced is eaten at some price. Beef cattle prices have been good only because supply is tight. So, record prices in the \$80 range for fat cattle and near record prices near \$90 for feeders don't signal a return of demand.

To trigger demand, the red-meat industry must focus U.S. efforts on developing convenient and price-competitive beef, pork and lamb products. The real test of whether consolidation in the beef industry provides more than short-term benefits for producers, packers and consumers will be when profit levels for packers are sufficient to fund product research and development. It is then that new products are most likely to be created. If the R & D investment is not made, then consolidation may have to be viewed in a less favorable light. Although packers may finance product development research, it's up to the entire red-meat industry to implement research results.

I'm talking about expanded industry cooperation all the way back to the farm level that tailors products for consumer demand. It needs to happen not just on the cutting floor or research laboratories of packing houses but all the way into feedlots and herds. That's how the industry collectively can attract the market basket dollars of disenchanted U.S. consumers.

At Excel, we've already introduced a "Perfect Trim" program that offers meat wholesalers and retailers meat cuts with reduced exterior fat and case-ready vacuum-packaged Excel Brand beef. We've also done considerable research on identifying characteristics of cattle that are needed to meet consumer demands and instituted a beef specification system based on that research. These and numerous other efforts are expensive but we believe in them because they will contribute to the benefit of the overall meat industry, and beef in particular.

On the export front, there has been considerable progress. With only about 4 percent of U.S. beef production flowing into export channels, there is certainly room for more U.S. exports, but the competition will be tough. In 1989, exports accounted for 850 million pounds of carcass weight, or 3.7 percent of total U.S. production. That was worth a record 2.1 billion dollars.

The area of greatest potential in exports are Pacific Rim nations, led by Japan. The Japanese already are the number one market for U.S. beef exports, with 180,000 metric tons shipped there in 1989. Full liberalization of Japanese beef trade restrictions next April is expected to keep export totals climbing.

Another export bright spot is South Korea, which by mid-May of this year had imported 50,000 metric tons of a 58,000 metric ton quota for the full year. Officials of the U.S. Meat Export Federation report that South Korea's appetite for beef is stronger than that of the Japanese. They predict that when complete markets are fully open to imports in 1997, South Korea could become the number one U.S. customer. Exports to Mexico also have been growing.

If the European Community can be persuaded to stop its prohibitive non-tariff trade barrier protection of livestock producers, that area of the world represents a sizable market for U.S. byproducts, and perhaps quality meats.

Further penetration of these export markets will not be easy. The Australian and New Zealand livestock and packing industries already have developed packing plants devoted to meeting specific product requirements of the Japanese market. Australia exports fully 45 percent of all beef produced in that country. To do so, it devotes facilities, research and product development funds well beyond the amounts currently allotted by U.S. check-off programs.

Despite Australia's lead in plants dedicated to Japanese products, the United States currently provides 43 percent of all beef imports by the Japanese. As liberalization of trade helps reduce the price disadvantage of imported beef, Japanese demand for U.S. beef definitely will grow. Australia is expected to increase its beef feedlot operations and will be very aggressive in pricing grass-fed beef products. To maximize growth in U.S. exports will require careful identification of the markets the industry wants to pursue, keen recognition of competitively priced products and the preferences of consumers relative to U.S. products.

However, development of overseas markets for U.S. beef in countries with developing economies is a long-term process. The first priority for market development should be the United States, where the amount of per-capita disposable income already is conducive to eating higher off the food chain.

That's a rather hurried view of my perceptions of U.S. meat industry concentration, the focus of competition and prospects for the future. I'll try to answer questions if you have them.

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# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## WORLD AND U.S. OUTLOOK FOR SWEETENERS

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### INTRODUCTION

Ladies and gentlemen, it is both a pleasure and a privilege to represent the U.S. Department of Agriculture in addressing the Sweeteners Session of Outlook 1991. The theme of this conference is "Agriculture in a World of Change." This new decade is proving to be a time of significant global and domestic change that likely will shape the direction of the global and U.S. economies as well as the international and U.S. sweetener sectors. Internationally, there is a whole array of developments that are likely to be important to sweeteners--the implications of political and economic changes in Eastern Europe and the Soviet Union, unification of the European Community (EC) market, the outcome of the Uruguay Round of GATT negotiations, and the implications of the Persian Gulf crisis.

Concurrently, change in the U.S. market for sweeteners is linked to these international developments as well as the implications of the Canada- U.S. Free Trade Agreement, the prospect of a Free Trade Agreement with Mexico, the direction provided by the new Farm Bill, and the restructuring of the ownership of the U.S. industry that emerged during the second half of the 1980's. Change is also being prompted by a wealth of R&D, innovation, and new technologies being applied to the U.S. industry such as research in Hawaii on the micropropagation of sugarcane, alternative uses of bagasse, and development of plastics derived from sucrose. In California a beet processor is refining imported raw cane sugar to increase plant utilization. In the Northwest and elsewhere beet processors are using new technologies to desugar molasses. In the upper midwest, sugarbeet agronomists are improving techniques in the application of nitrogen to lift the sucrose content of beets. And researchers in Florida are evaluating producing sugarcane under flooded conditions with the aim of reducing the problem of subsidence on muck soils and as a method of filtering phosphorous fertilizer out of South Florida's surface water system prior to that water moving into the Everglades--a problem that is changing the biology of that unique ecosystem. Moreover, corn-sweetener producers are looking at new markets and uses and trying to solve the problem of moisture retention in crystalline fructose. Also, high intensity sweetener producers have petitioned FDA for approval of encapsulated aspartame and sucralose which could compete with sugar in baked goods.



In the broadest sense the purpose of my presentation and paper is to provide you with USDA's latest analysis of world and U.S. sweetener markets-- both our current forecasts and our thinking on emerging trends that will be pivotal to the direction sweetener markets are likely to take in the early years of the 1990's.

## WORLD SUGAR OUTLOOK

### Overview

USDA's revised forecast for 1990/91 world sugar, released earlier this week, indicates a near balance in global supply and utilization. Revised estimates for last season also reveal global production and use that was closely balanced, but followed four consecutive years when world consumption outstripped production, drawing stocks down to very low levels. World sugar stocks remain very tight. World carryover at the end of the 1990/91 season is forecast at 17 percent of consumption, similar to last season and well below the average of the 1980's which was 24 percent.

Last April, the world sugar price reached a high of 16 cents per pound for a brief period, but has since dropped sharply to the 9-10 cents range after it became clear that world production last year was sufficient to cover demand, and the outlook for this season's production was favorable. The continued tight supply situation, however, should keep prices from dipping much below their current level this season.

### Production

At last year's Outlook Conference, the USDA's forecasted world sugar production in 1989/90 at a record 105.7 million metric tons, raw value, up slightly from the year before, but 2.4 million tons less than consumption. We now estimate 1989/90 production at 108.3 million tons. Underlying the upward revision of the 1989/90 estimate is greater-than-expected outturn, mainly in India, China, and Brazil. India's production was boosted by excellent yields, favorable weather, and high domestic prices. Cuba's sugar sector overcome logistical problems and unfavorable weather during an extended harvest to attain an outturn close to the previous year's level. Higher sugarcane yields, and diversion of sugarcane from fuel alcohol to sugar production explain the upward revisions in the Chinese and Brazilian estimates, respectively.

Outturn for 1990/91 is now forecasted a record 109.9 million tons, up 1.6 percent from last season. Globally we estimate that nearly 20 million hectares of sugar crops will be harvested in 1990/91, 11.2 million hectares of sugarcane and 8.6 million of sugarbeets. Favorable weather in major beet and cane producing countries have gotten the year off to a good start. Increases in domestic prices have spurred planting and should result in production increases in several key countries. Strong world prices which prevailed for most of 1989/90 have also been factored into this upward trend, encouraging some growers in exporting countries to expand planted area.

USDA expects the most significant production advances to occur in the EC, India and China. EC production should be up 3.9 percent to a record 15.9 million tons. This upturn in part reflects expansion of planted area and good yields in France and in the Federal Republic of Germany and higher beet yields in the Netherlands. Taken together, these three countries account for 60 percent of the expected EC outturn. India's production is expected to be up nearly 7 percent in response to favorable weather, and price incentives which should encourage growers to sell their cane to mills rather than to producers of traditional non-centrifugal sugar. China's production is also expected to advance for the second season in a row to a record 6.0 million tons reflecting improved yields for both beet and cane on expanded harvested area spurred by governmental incentive programs. In contrast to these advances, the Soviet Union, the world's largest importer, is expected to have a smaller crop, and Cuba, the world's largest sugar exporter, is also expected to produce less. In addition, Australia's production is forecast to be down due to prolonged dry weather in the sugarcane growing areas in Queensland. Brazil's outturn is expected to be lower due to the lack of government price incentives to expand production and government policy which favors the production of fuel-alcohol from sugarcane over sugar.

### Consumption

Consumption of sugar in 1990/91 is forecast at 110.3 million tons, 1.8 million tons above the previous season. Over the past 20 years global sugar consumption growth has averaged about 2.0 percent per year largely reflecting population growth and the relative stability of the human diet. Sugar consumption in the world's three most populous developing countries, China, India, and Brazil, are all forecast to be up in 1990/91 and together represent nearly 27 million tons or about one-quarter of global use, compared with 17 million tons and 19 percent of global use a decade ago.

In addition, enhanced revenue from oil should give less-developed, petroleum-exporting countries the wherewithal to increase consumption through higher purchases of sugar on the world market. On the other hand, consumption in many less developed countries which acquire sugar on the world market should be hampered by foreign currency constraints, aggravated by the rise in the world price of oil. Consumption in Mexico and Indonesia, is also moving up reflecting population growth and the increased availability of sugar containing products, especially soft drinks.

For most of the countries of Eastern and Western Europe, consumption is expected to be either stable or somewhat higher. Sugar use in the Soviet Union, the world's largest consuming country at 14.1 million tons, is likely to expand over the previous year due to an increase in domestic supplies and in spite of rationing.

### Trade

World sugar trade remains relatively stable at 28 to 29 million tons not unlike most of the 1980's. This stagnation can be attributed to several interrelated factors including slow economic growth in developing countries, and successful import substitution programs in those countries. In addition, the industrialized consuming economies reached saturation levels, and new substitutes appeared on the market such as corn sweeteners and new high

intensity or low-calorie sweeteners. These factors appear to be still at work as we head into the early 1990's. No new dominant trends are as yet discernable.

World exports in 1990/91 are expected to reach about 27.6 million tons, down by almost 1.8 million tons from 1988/89. Production problems experienced by some of the world's major exporters, and relatively lower prices compared to last year should make sales on the world market less attractive for a number of countries. The world's five leading exporters, the EC (including intra EC-trade), Cuba, Thailand, Australia, and Brazil, are expected to supply about 70 percent of the total.

Reduced shipments from Brazil and Cuba should account for a significant portion of the drop in 1990/91 exports. Despite its traditional importance as a global exporter, Brazilian policy makers generally give precedence to the satisfaction of domestic sugar and fuel alcohol requirements over sales on the world market. Because of the exigencies of the domestic market, together with lower world prices for sugar, exports are forecast at only 800,000 tons, the lowest since 1965. For Cuba, exports should also be lower in 1990/91 reflecting its smaller crop, but with only about 10 percent of production required for domestic use, Cuban exports will again provide about one-quarter of the world total.

Global imports for 1990/91 are expected to roughly match exports at 27.9 million tons, down 735,000 tons from the previous year. Increased production in a few key countries, foreign currency constraints, and the effects of the Gulf crisis help explain the decline. Booming production in India is expected to make imports unnecessary for 1990/91. Purchases in Eastern Europe are forecast to shrink by about one-quarter, largely the result of economic austerity programs which should reduce the domestic demand for sugar via price and income effects. Also Iraqi imports are expected to fall sharply, as the United Nations embargo cuts off that country's traditional sources of supply. Imports into the Soviet Union are forecast to be down somewhat at 4.5 million tons, 16 percent of the world total. China is expected to nearly double imports to the 2.0 million ton level in order to replenish stocks drawn down last season and to take advantage of lower world prices.

### Stocks and Prices

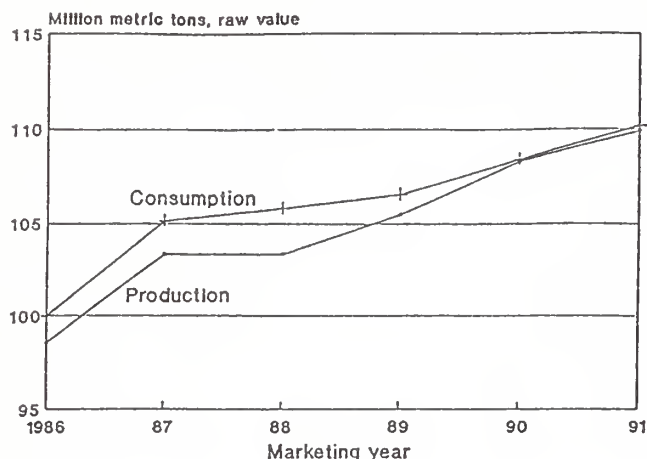
USDA's 1990/91 world ending stock level is forecast at close to 18.7 million tons, marginally lower than 1989/90. With consumption expected to be in close balance with production, stocks should remain relatively stable. Nonetheless, it is important to note that the stocks-to-consumption ratio, which gives an indication of tightness of supplies, is forecast at 16.9 percent, the lowest in USDA's historical series, which dates from 1974/75. Disruptions experienced by major exporting countries coupled with unexpected surge in import demand could readily upset the balance between production and consumption, placing greater pressure on world prices.



# World Sugar

Figure 1

World Sugar Production and Consumption



Source: USDA

Table 1—Sugar production in the European Community and selected major producing countries

Country or area	1988/89	1989/90	Forecast 1990/91
Million metric tons, raw value			
European Community	14.8	15.3	15.9
India	10.2	12.0	12.8
USSR	8.9	9.6	9.3
Cuba	8.1	8.0	7.5
Brazil	8.6	7.8	7.5
United States	6.1	6.0	5.9
China	5.3	5.7	6.0
Australia	3.7	3.8	3.6
Thailand	4.1	3.5	3.7
Mexico	3.7	3.1	3.2
Total, selected countries	73.5	74.8	75.4
World total	105.5	108.3	109.9
Percent			
Selected countries share of global production	69.6	69.1	68.6

Source: USDA.

Table 2—Sugar consumption in the European Community and selected major consuming countries

Country or area	1988/89	1989/90	Forecast 1990/91
Million metric tons, raw value			
USSR	13.8	13.9	14.1
European Community	12.2	12.2	12.3
India	11.2	11.5	12.0
United States	7.5	7.7	7.8
China	7.5	7.6	7.6
Brazil	6.6	6.8	7.0
Mexico	3.8	4.0	4.2
Japan	2.8	2.8	2.7
Indonesia	2.3	2.4	2.5
Pakistan	2.2	2.3	2.4
Total, selected countries	69.9	71.2	72.6
World total	106.6	108.5	110.3
Percent			
Selected countries share of global consumption	65.6	65.7	65.8

Source: USDA.

Table 3—World raw and refined sugar price

Year, quarter, and month	World raw sugar 1/	World refined sugar 1/	Spread between world raw and refined sugar price
Cents per pound			
1985	4.04	6.80	2.76
1986	6.05	8.47	2.42
1987	6.71	8.75	2.04
1988	10.17	12.01	1.84
1989	12.79	17.15	4.36
1989			
I	10.57	13.52	2.95
II	12.23	16.26	4.03
III	14.03	21.14	7.11
IV	14.32	17.69	3.37
1990			
I	14.80	19.53	4.73
II	14.28	19.66	5.38
July	11.92	17.42	5.50
Aug.	10.91	16.53	5.62
Sep.	11.00	14.39	3.39
Oct.	9.77	13.98	4.21

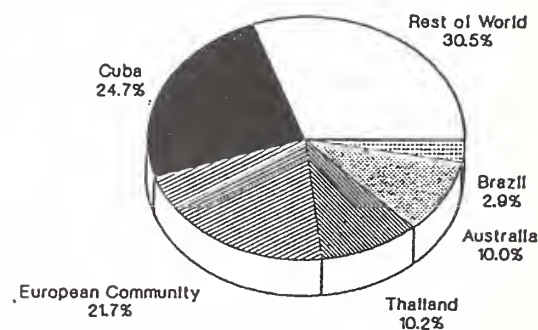
1/ Contract no. 11, f.o.b. stowed Caribbean ports.

2/ Contract no. 5, f.o.b. Europe.

Sources: Coffee, Sugar, & Cocoa Exchange, Inc., London Commodity Exchange.

Figure 2

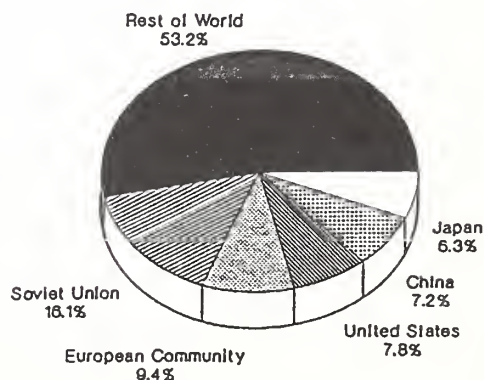
Shares of World Sugar Exports, 1990/91\*



\* Forecasts  
Source: USDA

Figure 3

Shares of World Sugar Imports, 1990/91\*



\* Forecasts  
Source: USDA



## Key Developments Important To Global Sugar Markets

- **Middle East-** Events in the Middle East could lead to additional price volatility in 1990/91. Middle Eastern countries are forecast to account for about 12 percent of world sugar imports in 1990/91, and any disruption in trade could limit this demand, causing prices to fall. Moreover, higher oil prices are likely to slow economic growth in Western Europe, Japan, and North America which could alter current sugar demand forecasts. Eastern Europe's struggling economies are almost totally dependent on oil imports, and oil-importing developing countries which import sugar could cut back on shipments.

As at least a partial offset, some oil-exporting countries that reap windfall profits from higher oil prices probably would import additional sugar, thereby increasing demand and putting upward pressure on prices. Several oil-exporting countries, such as Nigeria, Indonesia, Mexico, and Venezuela, boosted sugar imports significantly in the late 1970's and early 1980's when oil prices were high.

- **Eastern Europe and the Soviet Union-** Momentous change is underway in most Eastern European countries and the Soviet Union. The economic restructuring to market economies almost certainly signals an impact on sugar. While per capita consumption of sugar in these countries is comparable to levels in Western Europe, production efficiencies are not. Sugar yields are not much above where they were at the beginning of the post World War II era and much of the machinery in processing factories is antiquated. How rapidly yields rise and demand for sugar imports drops will largely depend on the pace of western investment in the East's sugar industries. It will take time for the transfer of technology from the West. Moreover, massive changes are also needed to the infrastructure in terms of harvesting, transporting, storing, and processing sugarbeets. As a result, it is extremely difficult to predict when a significant, sustained annual upturn in outturn can be expected. However, over the long-term major production improvements are likely, the consequence of which would be the generation of exportable surpluses in many of these countries and reduced dependence on imports by others.

- **Latin America-** A number of important trends are emerging in this region noted for its significant production of sugar for export. Mexico, one of the world's leading sugar producing and consuming countries, is privatizing its sugar industry with the goal of regaining self-sufficiency. In recent years, Mexico has become an important market for refined sugar imports to help satisfy its growing domestic needs and to offset lagging production. With privatization and infusion of new investment capital it is reasonable to expect Mexico to meet its internal needs from domestic supplies and return to be a sizeable consistent exporter.

Two countries in the region that appear to be moving in opposite directions are the Dominican Republic and Guatemala. Dominican production continues to slide downward largely reflecting management and resource limitations of the government's State Sugar Council (CEA), and complicated by prolonged drought which has beset Hispaniola. Guatemala, in contrast, is expecting a record crop of 900,000 tons, double what it was producing a decade

ago, reflecting expanded area, higher yields, and entrepreneurial skill of private sector managers of this sugar industry.

The direction of the region's two major sugar-producing nations, Cuba and Brazil, appear especially uncertain. Frequent reports from Cuba concerning supplies of fuel and a scarcity of spare parts necessary to operate harvesting equipment and raw cane mills are illustrative of the changing relationship between Cuba and its traditional partners in Eastern Europe and the Soviet Union. Sugar trade with some Eastern Europe countries has all but disappeared and Cuba's five-year bilateral trading contract with the Soviet Union expires December 31, 1990. While the Soviets will still need millions of tons of Cuban sugar annually (the current contract calls for 4.2 million tons annually) the new trading relationship may have radically different terms. All in all, the situation points to an era in which Cuba will be seeking new trading partners and marketing more of its sugar on the world market. This spells increased competition for free world market shares among Cuba and other sugar-exporting countries in Latin America.

For oil-import-dependent Brazil, the Middle East crisis and resulting higher oil prices, has revitalized support for the country's sugarcane-based fuel-alcohol program including a commitment by Brazil's new president Fernando Collor de Mello. However, no significant steps have been taken to encourage expansion of sugarcane production to service the country's multiple uses of cane. With domestic sugar prices at the consumer level held down to fight inflation, consumption is on the rise, exports are contracting, and it is likely that Brazil will again need to supplement domestic fuel-alcohol supplies with imports.

It is also important to note that within Latin America there is an important effort underway to diversify the uses of sugarcane and some of its byproducts. For example, GEPLACEA (the Organization of Latin American Sugar Exporting Countries) is involved in funding and evaluating projects for bagasse in the production of pulp and paper. At a recent conference in Brazil, the focus was on the enhanced potential of electricity generation from bagasse tied to the development of a new generation of gas turbines. According to Jose Goldenberg, Brazil's Minister of Science and Technology, cane-based electricity can be an important supplement to hydro-electric based power for Brazil.

- **Africa** - Africa's production, trade, and use have been relatively stable in recent years. However, significant changes could be forthcoming for three key countries--Egypt, Nigeria, and South Africa. The continent's major user of sugar, Egypt, accounts for about one-third of total use at 1.7 million tons, and continues to supplement domestic production with imports. For 1990/91 Egypt's imports of sugar are forecast to remain relatively stable due to a shortage of foreign exchange which is aggravated by balance of payments problems, and to slackened demand, despite sharply rising population growth. Purchases could increase, however with an improvement in Egypt's economy, resulting from an International Monetary Fund stand-by agreement, or an infusion of cash which could emanate from Egypt's allies in the Gulf Crisis.

For Nigeria, which in the early 1980's was the continent's largest importer, the prospect of increased oil revenues could lift imports from around 400,000 tons now to the 1.0 of early 1980's, or even higher. Nigeria's population has grown 30 percent during the last 10 years to nearly 120 million.

For the continent's major sugar-exporting country, South Africa, accounting for one-third of total exports, annual production and exports have been hovering for a number of years around the 2.1 million and 900,000-ton mark, respectively. Less deregulation could lift annual production by around 300,000 tons, most of it for export. Owing to the timing of its harvest and recent investments in bagged sugar storage facilities at Durban harbor, South Africa will be in a position to offset partially reduced exports from Brazil.

- **Asia & Oceania-** There are important developments and initiatives in this part of the world that deserve to be highlighted and monitored. Australia, has loosened regulations on its industry and is likely to expand harvested area, and exportable supplies in the years to come. Thailand, the new sugar exporting superpower, has the installed milling capacity to expand output greatly, and with the aid of programs to provide incentives to farmers to improve yields and cane quality, could lift production in the near future to 5.0 million tons, nearly 1 million tons above the record of 1988/89. Owing to its relatively low level of domestic use, most of this potential growth would be marketed as exports. Indonesia also is undertaking plans to expand production and reduce imports and within a few years hopes to become self-sufficient in sugar. In part, these targets are being fostered by government deregulation of the industry, development of the sugar industry outside Java, and a new policy to allow growers to sell directly at least one-half their production without the intervention of the government purchasing agency.

For the world's two most populous countries--India and China--recent developments are particularly interesting. India has shifted from being a significant importer, to self-sufficiency, to being an exporter. While three straight good monsoons have helped this transition, the country's production infrastructure has been substantially improved and conditions are in place for continued growth in output. Production growth is currently outpacing consumption leading to the direction of a renewal of exporting this season--the first significant exports since 1983/84. Because of the relatively high domestic price of sugar in India, which exceeds the current world price, the government will be obliged to subsidize these shipments. But revenues from these sales will help the government offset high-priced oil imports (India imports about one-half of its domestic oil needs). While consumption is also expanding, per capita use at around 15 kilograms remains well under the world average of 20 plus kilograms

Also in an expansionist mode is China's sugar industry. China's production more than doubled during 1979/80-1986/87 and then faltered. Recent hikes in procurement prices and other incentives have encouraged an upturn in production to a record 6.0 million tons this season. Also there are signs of a recovery in China's economy which is expected to boost demand for sugar. With stocks now drawn down, imports are expected to be up in 1990/91, especially with world prices lower. Over the long term, China is likely to remain one of the world's largest sugar importers. A statement released by



China's Ministry of Agriculture last year, acknowledged that China will need an average of 2 to 3 million tons of sugar every year until at least the year 2000. The Ministry forecasts output in the year 2000 at 12 million tons, double the current year's record forecast, but domestic demand will be even higher at 14.7 million tons. Provided foreign exchange is available, and world prices are not extremely high, China can be expected to be a steady importer of around 2.0 million tons annually.

## U.S. SWEETENERS

### Overview

The U.S. caloric sweetener complex, the world's largest and most diverse in terms of consumer products, is expected to continue to expand in 1991. Total use of refined sugar, corn sweeteners (HFCS, glucose, and dextrose), pure honey, maple syrup, and edible molasses is likely to surpass 17.0 million short tons, dry basis in 1991, up nearly 10 percent since the mid 1980's. Complementing the growth of caloric sweeteners is the expansion of high intensity or low-calorie sweeteners such as aspartame, acefulfame-K and saccharin in a growing number of beverages, food products, and as top-table sweeteners. This expansion of both caloric and high intensity sweeteners reflects growth in the U.S. population, increased per capita income, and changes in consumer lifestyles and tastes that encompass both the "light food" phenomenon spurring the use of diet products including low-calorie sweeteners, as well as growth in the consumption of "natural foods" such as sugar, and corn sweeteners.

## U.S. Sugar

### Overview

U.S. sugar market fundamentals for the fiscal year just ended (1989/90) and for fiscal 1990/91 has proved to be elusive for forecasters. Sugar production has been lower than initial estimates despite expanded acreage, improved breeding material, and ever-increasing agronomic knowledge--such as the management of nitrogen. Sugar consumption, in contrast, has been higher than initial estimates despite higher consumer prices and the increased availability of alternative sweeteners.

The task of managing the U.S. sugar program appears to be getting more complicated. The U.S. Government has moved to a tariff-rate quota system and made significant adjustments to USDA's re-export programs for refined sugar and sugar containing products. Moreover, the new farm bill includes program provisions for sugar that virtually guarantee U.S. refiners at least 1.25 million short tons (raw value) of imported sugar. The new provision requires that marketing controls be imposed on domestic cane, beet sugar, and crystalline fructose if USDA estimates that imports would be less than 1.25 million tons. The new legislation provides for a loan program for 1991-1995 crops of sugarcane and sugarbeets at a minimum loan rate of 18 cents a pound for raw sugar, the same as the 1985 farm act. Loan terms under the new program are for 9 months instead of 6, and the beet sugar loan rate will be calculated on the basis of a 5-year relationship between producer returns for sugarbeets and sugarcane. USDA had been using a 10-year basis.



In addition, the Omnibus Budget Reconciliation Act of 1990 imposes an amendment on the 1990 farm bill requiring a marketing fee of 1 percent of the loan rate on sugar for the 1990-95 crops. The provision apparently amounts to a fee of 0.18 of a cent a pound on raw cane sugar and 0.193 of a cent a pound on refined beet sugar. The fee will be paid by beet refining and cane milling companies and the cost shared with growers.

At the technical level, the provision in the farm bill which requires that the industry report monthly production, marketings, and stocks to USDA for compilation, analysis, and publication will greatly improve management of the sugar program. This increased flow of data will be invaluable to USDA sugar analysts in keeping a pulse on this ever-changing and dynamic market.

## **Production**

U.S. sugar production for fiscal year 1990/91 is now estimated at 6.5 million short tons raw value, comprised of 3.7 million tons in beet sugar and 2.8 million tons of cane sugar. This represents the third straight season of decline following the near record-breaking year of 1987/88 when over 7.1 million tons were produced. Drought in the Red River Valley, the after-effects of last December's freeze in the Louisiana cane fields, and reduced acreage in California and Hawaii have all taken their toll on this year's harvest.

Sugarcane production is estimated at 25.3 million tons, compared with 28 to 30 million the previous four seasons. This season's small total outturn reflects lower yields and a 16 percent reduction in acreage harvested. But the situation is mixed across the different growing areas. Florida's cane sugar production has been revised upward to a record 1.58 million tons, 12 percent above last year. Timely rains in Florida offset water restrictions and yields are well above the December, 1989 freeze-affected totals of last year. Texas output is expected to improve to 90,000 tons, more than 50 percent higher than last year's weather-affected crop. In contrast, Hawaii's output has been trimmed to 835,000 tons. USDA's estimate for Louisiana is 260,000 tons, compared with a record 844,000 tons last year. There is a wide variance in the estimates of Louisiana output due to last year's devastating freeze damage--our current estimate could be on the low side (other crop forecasters place the crop between 300,000 and 400,000 tons).

Sugarbeet production is estimated at 27.0 million tons for 1990/91, up 15 percent from last year, but still 1 million tons below the 1987/88 level. The upturn reflects some improvement in yield and expanded acreage--1.4 million acres harvested, which is the highest level in 15 years. A bumper crop is in the offing in the Great Lakes states of Michigan and Ohio, where beet tonnage is up 28 percent to 3.5 million tons due to higher acreage and beet yields of 20-21 tons. Great Plains beet production is up 17 percent to 5.9 million tons due to higher acreage and yields, especially in Montana, Wyoming, and Texas. Production of beets in the Northwest States of Idaho and Oregon is estimated at 5.1 million, up 14 percent from a year ago. California beet production is again lower at 4.5 million tons, 3 percent below last year and more than 1.5 million tons below the crop harvested 3 years ago. Lower acreage and hot temperatures are responsible for the decline in California. Lastly, production in the Red River Valley States of North Dakota and Minnesota is off 2 percent from last season at 8.1 million tons as generally

poor growing conditions more than offset expanded acreage, and higher reported sugar content in the northern portion of the Valley. Despite these offsetting developments, beet sugar production is forecasted to be up 8 percent to 3.76 million tons. It will be especially interesting to watch how much sugar production is enhanced by molasses desugaring equipment now on line in several plants across the United States.

## Consumption

U.S. sugar use in 1990/91 is now forecast to increase one percent to 8.6 million tons, the fifth straight year of rising consumption and the highest level of sugar use since 1982/83. To place this new trend in perspective, U.S. sugar consumption peaked in 1976/77 at over 11 million tons. Then consumption declined for 9 consecutive years, as high-fructose corn syrup (HFCS) replaced sugar in soft drinks and in some other uses. Sugar consumption bottomed out at 7.8 million tons in 1985/86, and has risen steadily since, as sugar in non-beverage uses has continued to grow.

The revised forecast for 1990/91, up 125,000 tons from the estimate published in September, was necessitated by new data released last week in USDA's Sugar Market Statistics report. Sugar delivery data released in that report were very strong for the July-September quarter and enabled us to finalize the marketings for fiscal 1989/90 (Oct.-Sept) at 8.51 million tons--1.7 percent higher than our September estimate and, 3.5 percent above 1989/90 consumption.

What are the underpinnings of this renewed growth in sugar use? Population and income growth are two answers. Also, the markets for two of the primary industrial uses of sugar, bakery and cereal products, and confectionery, have been especially strong. According to Sugar Market Statistics, sugar deliveries to bakery and cereal manufacturers for fiscal 1989/90 totaled 1.57 million tons, refined, compared with 1.53 million the previous fiscal year. Sugar deliveries to confectionery manufacturers rose even more in percentage terms, to 1.27 million tons, from 1.16 million for the previous year, a 9.5 percent increase. According to industry sources, confectionery sales soared during the past 12 months with chocolate confectionery up 12.5 percent and sugar confectionery up 8 percent. Confectionery appears to be the driving force behind the rise in sugar deliveries. It is important to also note that lower cocoa prices have allowed for lower candy prices.

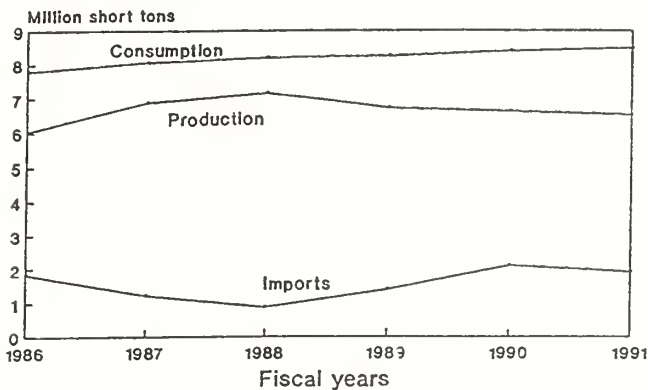
## Trade

The U.S. remains a large net sugar importer. For the fiscal year just ended, offshore receipts totaled 2.6 million tons, of which quota imports comprised about 2.0 million tons, and quota-exempt imports for reexport 570,000 tons. Most of the 40 countries with quota allocations filled their quotas, but several did not, leaving a quota shortfall of about 100,000 short tons. Activity under the re-export program was especially strong in 1989/90 with total exports for the fiscal year reaching 614,000, the highest level in several years. The bulk of these export shipments was refined sugar shipped to Mexico, 44 percent of the total.

# U.S. Sugar

Figure 4

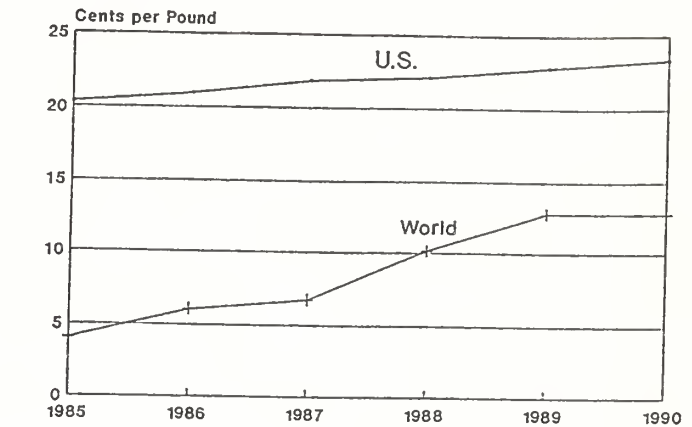
U.S. Sugar Production, Consumption\*, and Imports\*\*



\*Based on shipments to primary distributors. \*\*Based on annual quota imports since 1982.

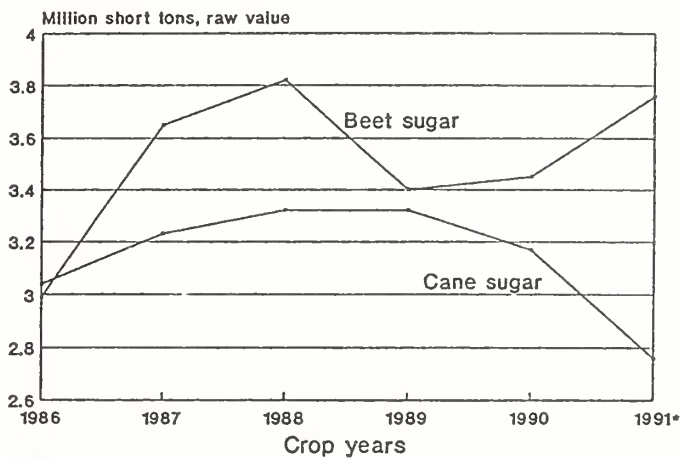
Figure 7

World and U.S. Raw Sugar Prices



Source: USDA

## U.S. Sugar Production



\* Forecast  
Source: USDA

Table 4—U.S. sugar supply and use, fiscal years

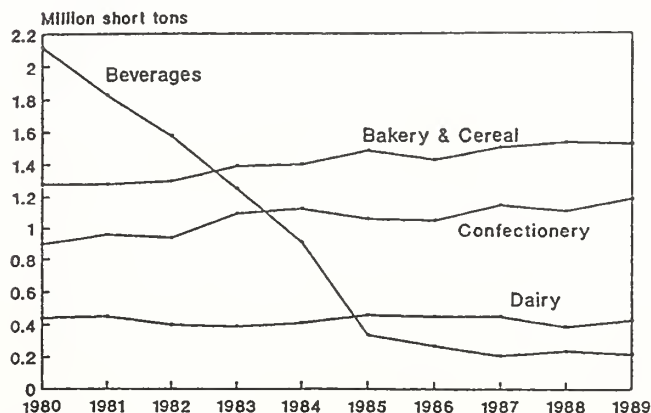
Description	1988/89	1989/90	1990/91 Forecast
Total production:	6,713	6,622	6,520
Beet sugar	3,356	3,466	3,760
Cane sugar	3,317	3,156	2,760
Florida	1,564	1,404	1,575
Louisiana	797	844	260
Texas	110	59	90
Hawaii	846	849	835
Quota imports	1,376	1,971	1,970
Oct-Dec	351	218	525
Jan-Sept	1,025	1,753	1,445
Exports	516	614	550
Deliveries	8,226	8,514	8,600
Ending Stocks	1,224	1,212	1,045
Stocks to use ratio 1/	13.9	13.2	11.4

1/ Based on total use.  
2/ Assumes 20,000 tons from Canada, 18,000 tons from Mexico, 32,000 tons yet to be registered from 1989/90.

Source: Economic Research Service, USDA.

Figure 6

U.S. Sugar Deliveries by Type of Major Food Uses



Source: USDA

## U.S. Sweetener Market Key Developments to Watch

- **Production** Beet desugaring technology  
Alternative crops in California and Louisiana  
Alternative uses of sugarcane from Hawaii
- **Consumption** Will slow growth in sugar use continue?  
Sugar substitutes and blending
- **Trade** Sweetener trade with Canada and Mexico

Owing to the upward revision in the consumption estimate, lower beginning stocks because of the quota shortfall, and production estimates holding at 6.5 million tons, pressure is mounting from users for USDA to increase its fiscal 1990/91 lower-duty import quantity (quota) currently set at 1.9 million short tons. This, of course, is a call that our policy makers are studying in light of these new estimates and current prices of 23-plus cents per pound.

#### **Key Developments**

##### **Important to U.S. Sugar Market**

• **Changes in producing areas** - Several important growing areas appear to be at turning points. In Hawaii, removal of high-yielding acreage from production, excessive rain, and agronomic problems affecting yields account for the sharp drop in production over the last several years. The problems appear to be long-term and a reversal in output is not expected soon. In Louisiana, the question is whether the areas most devastated by last December's freeze will be replanted to cane. In the past, some of the hardest-hit areas in northern Louisiana have shifted from cane to soybeans and back again to cane. Will some of these areas revert back to soybeans especially in light of the reoccurring freeze problems and the increased distance to mills following the closure of some local mills? In Florida, acreage has expanded from 339,000 acres in 1980 to 433,000 in 1990, a 28 percent increase. It seems unlikely that this pace of expansion will continue owing to the limits on the availability of good cane soils as well as increasing environmental concerns in Florida. Interestingly, one answer to environmental problems may be with research underway at USDA's Belle Glade sugarcane experimental station. Researchers there are evaluating cane varieties that could be grown in standing water as a means to cut down on the serious problem of subsidence of Florida's rich muck soils. Moreover, the production of cane under flooded conditions in selected areas could be one means to reduce the flow of phosphorous fertilizer into the Everglades which, in part, is changing the plant population of South Florida's unique wetland resource.

Lastly, in California, sugarbeet acreage continues its down trend -- 165,000 this year versus 216,000 in 1987-- reflecting the viability of alternative crops as well as water and disease concerns. With respect to irrigation water, California has had 4 consecutive years of less than normal rainfall. Another year of drought, or even its prospect, could cause growers to cut back on acreage planted. In addition, the soil fumigant "Telone" used to control rhizomania and root knot nematodes was banned last spring. There is currently no substitute for it on rhizomania-infested soils and this could also result in a decline in acreage planted. According to industry sources, research is underway to find a rhizomania resistant hybrid beet variety. Also, one beet processor located near a port is augmenting its reduced supply of beets by refining imported raw cane sugar.

• **Desugaring technology** - Beet molasses desugarization, using new processing technology is getting a high profile in the refined sugar industry. The technology has been reported to be operational at three plants, one each in Ohio, southern Minnesota, and western Idaho, and is now being installed at Hereford, Texas, for use next season. Moreover, it is probable that these



plants will draw molasses from surrounding areas in order to maximize operational capacity. According to informed sources, the new technology can yield about 38 pounds of sugar from every 100 pounds of molasses. If the technology is successful, we expect that it will spread rapidly throughout the U.S. beet industry and, in time, overseas.

Interestingly, the cane industry is also looking at its feasibility. For example, in a speech two weeks ago in Honolulu, Don Heinz, President of the Hawaiian Sugar Planters' Association (HSPA) Experiment Station, mentioned that his industry could potentially benefit from the technology to the tune of 70,000 tons per year at current molasses production levels.

- **Growth in deliveries** - Deliveries of sugar are showing surprising strength. How long will it last? Will the increased availability of substitutes reverse the trend? We foresee continued, but slow growth and the sharp upturn suggested by data for the July-September quarter may be an aberration--some knowledgeable market observers account for the upturn as reflecting strong export demand for sugar-containing products due to the current weak U.S. dollar and the build-up associated with "Desert Shield." For these reasons, USDA analysts revised our 1990/91 forecast by 1 percent to 8.6 million tons versus a 3.5 percent growth rate now established between 1989/90 and 1988/89, and average annual growth of 1.8 percent in 1986/87-1988/89.

- **Trade** - Some in the market suggest that there may be another quota shortfall in fiscal 1990/91. It has been suggested that some countries in the Caribbean especially may not be able to fill their quotas due to a deterioration of their sugar industries, despite the attractive price premium between the U.S. and world market. On the export side, the Mexican market has been an important outlet for our re-exported refined sugar. We have research underway to examine the sustainability of that market, or the possibility that Mexico may shift back to its more traditional role as an exporter.

## World and U.S. High Fructose Starch Syrups (HFSS)

### World

The world's second most important sweetener behind sugar is high fructose starch syrup (HFSS) derived from corn, other grains, and other starch sources such as potatoes. According to various industry sources and data supplied by USDA's agricultural attaches around the world, HFSS output in 1990 is estimated at 7.8 million metric tons, dry basis, compared with 6.3 million in 1985 and 2.6 million in 1980. The U.S. accounts for more than 75 percent of the world total. Japan and Canada, the other major producers and consumers, comprise about 15 percent of world use. The EC has HFSS production quotas set at 292,000 metric tons per year.

The bulk of HFSS consumption takes place in countries where it is produced. Currently, there is limited international trade except across the U.S.-Canadian borders.

## Developments in Major Producing Countries Other than the United States

- **Canada** - Canada has three HFSS facilities, all in Ontario Province. Together, they can grind 100,000 bushels of corn daily and produce 250,000 to 300,000 tons of HFSS annually. These plants normally utilize about 15 percent of the Canadian corn crop, which averages about 250 million bushels. Canadian wet millers periodically supplement domestic corn supplies with imports of U.S. corn. There is a duty on imported corn to bring it up to the Canadian price. However, the Canadian wet millers can obtain "drawback" (equivalent refund of the corn import duty) when exporting HFSS to the United States. This policy enables the Canadian HFSS producer to compete with U.S.-produced HFSS in U.S. markets.

As in the United States, Canada's HFSS is sold at a discount to sugar. However, the discounts are much less because the wholesale price of refined sugar in Canada is more closely tied to the world price. In recent years, the lower refined sugar price Canada has restrained domestic use of HFSS. As a result, Canada has exported an average of 185,000 tons annually to the United States, or over two-thirds of HFSS production during 1985-1989.

With world sugar prices rising from 4 cents in 1985 to 13-14 cents a pound in 1989 and a high of 16 cents last spring, HFSS became relatively more competitive with sugar inside Canada, especially in the liquid sweetener market. Moreover, rising world sugar prices coupled with decreasing duties has provided a greater incentive for U.S. HFSS producers to market their product in Canada. For the fiscal year just ended (1989/90) U.S. HFSS exports reached a record 49,967 short tons, compared with 20,310 tons the previous fiscal year. Canada is a major recipient of U.S. HFSS exports. With world sugar prices now in the 9 and 10 cents range, it will be interesting to watch for further shifting in the trade.

- **Japan** - Japan's HFSS production has grown from 350,000 tons in 1980 to 700,000 tons in 1990 according to the U.S. Agricultural Attache in Tokyo. In Japan, HFSS does not compete as freely with sugar as in the United States or Canada. Instead, Japanese policy raises the cost of production by requiring HFSS producers to purchase a fixed percentage of domestic potatoes as a starch source along with imported corn, and by taxing HFSS to support the sugar regime. In recent years, the output of HFSS has stabilized as growth in its substitution for sugar in the soft drink market has ended.

- **European Community (EC)** - EC policies effectively prohibit production of "second-generation" or 55-percent-fructose HFSS, which is more closely substitutable for sugar in liquid applications such as beverages. With quotas strictly allocated by country and no provision for exchanging quotas between countries, economies of scale as those existing in the United States, are severely limited. High price supports for corn and other grains in the EC also reduce the potential competitiveness of HFSS. In recent years, HFSS production in the EC has averaged about 20,000 to 30,000 tons below the quota level.

# World and U.S. HFCS

Figure 8  
World High-Fructose Syrup Consumption

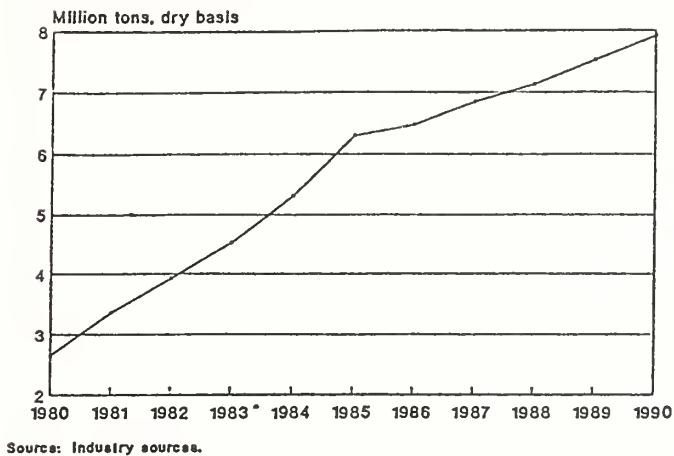
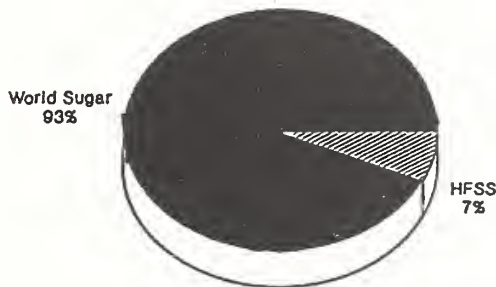


Figure 9  
World Consumption: Sugar and High Fructose Starch Syrups\*(HFSS)



Source: Industry sources.

## Growth in High Fructose Starch Syrup (HFSS) in Certain Countries

- Global consumption of HFSS in 1990 is forecast by a leading industry source at 7.8 million metric tons, compared with 2.6 million in 1980 and 0.6 million in 1975. The United States accounts for more than 75 percent of world HFSS consumption. Japan and Canada are the only other major consumers, together comprising about 15 percent of world of world use. The EC has HFSS production quotas at 292,000 tons per year.
- There is little trade in HFSS--the dominant share of production is consumed in the countries where it is produced. The only significant trade that now exists is the border trade between the U.S. and Canada, totalling around 200,000 tons annually. The potential exists for border trade in HFSS to develop between the U.S. and Mexico to service Mexico's expanding soft drink market.

\*HFSS is syrup made from potatoes, rice, or corn.

Figure 10  
U.S. Domestic Shipments of High-Fructose Corn Syrup

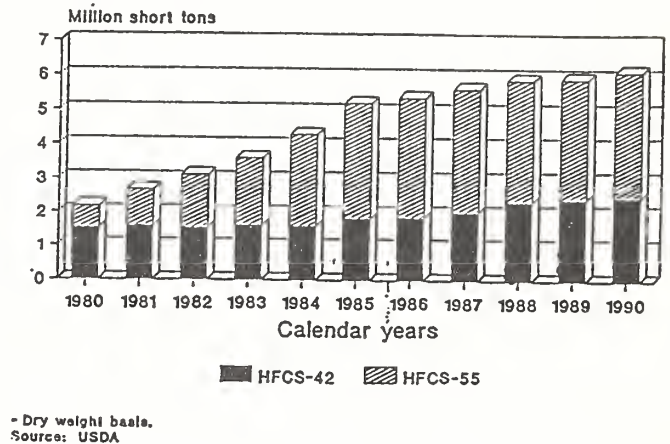


Figure 11  
U.S. HFCS Deliveries by type of use, 1989

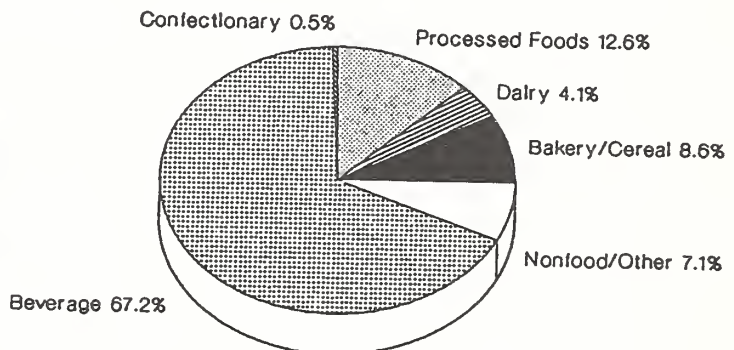


Table 5—HFCS prices and their discount to sugar, Midwest market, monthly and annual

Period	HFCS-42	HFCS-55	Re- fined beet sugar	Price discount to sugar	
				HFCS-42	HFCS-55
	Cents per pound, dry basis			Percent	
1985	17.75	20.03	23.18	23.4	13.6
1986	18.07	19.96	23.42	22.8	14.8
1987	16.50	17.46	23.60	30.1	26.0
1988	16.47	18.68	25.49	35.4	26.7
1989	19.24	21.41	29.38	34.5	27.1
1989					
I	16.56	18.50	29.08	43.1	36.4
II	20.37	22.63	29.50	30.9	23.3
III	22.50	25.00	29.23	23.0	14.5
IV	17.55	19.50	29.69	40.9	34.3
1990					
I	17.55	19.50	31.50	44.3	38.1
II	20.25	22.50	31.50	35.7	28.6
III	22.95	25.50	31.50	27.1	19.0

Note: These are Midwest market prices, except beet prices which prior to 1983 are list prices. HFCS prices are delivered basis. Beet sugar prices are l.o.b., bulk basis.

Sources: Milling & Baking News and John Crowe and Company.



## United States

USDA forecasts high fructose corn syrup (HFCS) utilization in calendar 1991 at 6.2 million short tons, dry basis, up 2 percent from the revised forecast for 1990. This compares with 5.2 million in 1985 and 2.2 million tons in 1980. The phenomenal growth of HFCS production in the United States over the last decade has been due in part to high U.S. sugar prices and in part to the stimulus of the sugar price spikes in 1974/75 and 1979/80. HFCS, with costs of production in the United States reportedly around 12 cents a pound, can profitably be priced cheaper than refined sugar which has been priced at 23-30 cents in recent years. For the July-September quarter of 1990, for example, HFCS-55 at 25.5 cents a pound was selling at a discount to sugar refined beet of 19 percent, midwest markets.

While HFCS use in the U.S. continues to grow, the expansion has slackened since 1986, as the product's substitution for sugar in many foods has reached its technical limit. Moreover, the use of HFCS in the United States as a sweetener is hindered by its syrup nature. While it has found use in soft drinks where the crystalline quality of sugar was not important, in other uses, such as bakery or confectionery products the lack of a crystalline character limits HFCS use.

R&D is underway into a crystalline version of HFCS to overcome this deficiency, and a crystalline product exists and is available as a table top sweetener. But its costs are relatively high and suffers some drawbacks such as high moisture retention which makes transport and storage difficult. However, given the technical know-how and track records of the companies involved, a more competitive product in the future is possible.

It appears the long-run future of HFCS in the United States is largely tied to soft drinks. According to "Beverage Digest", the soft drink market in the United States grew 2.2 percent in 1989, but consumption of non-diet soft drinks only grew 0.2 percent, while diet soft drinks grew by 8.2 percent. While representatives of Beverage Digest indicated in a recent speech that both segments will grow into the late 1990's, the diet share is expected to continue to expand.

### Key Developments

#### Important to HFSS Markets

Further growth of HFSS output will be strongly influenced by sweetener policies in producing countries. Further increase in the U.S. corn sweetener market share is expected to be small until or unless, a low-cost non-hygroscopic crystalline fructose sweetener is developed. Moreover, HFCS in the United States and Canada is likely to face competition for market share in soft drinks from high intensity sweeteners, especially aspartame. If utilization of aspartame provides bottlers with greater profits, there would be more incentive to emphasize production and sale of diet beverages at the expense of caloric or sugared ones. In Canada, where the patent on aspartame ended in July, 1989, the price of aspartame has fallen to where it is competitive with HFSS. The same pattern is likely when the U.S. patent on aspartame expires in December, 1992, about a year away.



Around the world, countries as diverse as Argentina, South Africa, and China (all sizeable corn producers) are considering modest HFSS production expansion, but there is little chance the growth of market share in any other country will duplicate the U.S. experience. The potential for large increases in HFSS production lies in the developed countries such as Japan and the EC which have proven production capability but have so far restricted production.

Another country to watch is Mexico. With the privatization of its sugar industry, and reduction of subsidies to producers, domestic prices are moving up, making the HFSS option more viable. Mexico's large and growing soft drink industry, accounting for 55 percent or 1.2 million tons of industrial use of sugar last year, is evaluating the feasibility of HFSS as a calorie sweetener. Interest has been emerging to evaluate equipping existing wet milling facilities to produce HFSS.

There also would appear to be the possibility of developing corn sweetener export trade from the U.S. to Mexico, especially along the heavily populated border, and away from Mexico's sugar-producing areas. In the final analysis, much hinges on price and the fall in world sugar prices from 16 to 9 cents over the last few months has reduced interest in switching from imported sugar to imported HFSS and diminished investor interests in building an HFSS industry.

### World and U.S. High Intensity Sweeteners

#### OVERVIEW

The third major component of world and U.S. sweetener markets is high intensity or low calorie sweeteners. This group of sweeteners includes cyclamate (30 times as sweet as sugar), saccharin (300), aspartame (180), acefulfame-K (200), sucralose (600), and alitame (2,000). The regulatory status of these sweeteners varies from country to country (e.g. cyclamate has restricted use approvals in Canada, but has been banned in the United States since 1970, although its status is now under review by the Food and Drug Administration (FDA). Aspartame has been approved for use in more than 80 countries including the United States and is available in more than 1700 products world wide. Acefulfame-K has been approved for use in more than 30 countries including the U.S. and petitions for approval are pending in Canada, Australia, and the EC.

The bulk of high intensity sweetener use is currently concentrated in developed countries in Western Europe, North America, and Japan where there is a high level of diet consciousness. In addition to diet soft drinks, these markets are experiencing considerable growth and proliferation of their use in "light foods"-- one of the fastest growing segments of many food industries. In the United States, for example, of 10,000 new food products introduced last year, 1,000 were light products ranging from light ice-cream to light yogurt to light jams and spreads.

In developing countries, caloric sweeteners such as sugar or starch sweeteners in soft drinks are seen by health authorities as an important energy source contained in a beverage where availability of potable water is often a problem. Nevertheless, there are large segments of the populations of

many developing countries where diet consciousness and health concerns make the attractiveness of diet products containing low-calorie sweeteners potentially lucrative markets.

Each of the new sweeteners has slightly different properties and qualities. The lack of some qualities, such as bulk or a crystalline form, may prevent ready acceptance by users. One approach that marketers of these products may take is to use "blends" of these products together or with sugar, or corn based sweeteners. Before it was banned in the United States, saccharin and cyclamate were commonly blended. Other combinations are feasible such as saccharin and aspartame.

An additional advantage of blending is the synergistic effect, that is, the sweeteners are sweeter together than alone. High-intensity sweeteners could also be blended with sugar or corn sweeteners to capitalize on the positive qualities of the new sweeteners as well as the positive qualities of sugar, such as bulk. For example, one part aspartame to 200 parts sugar blend would provide the same sweetness value as pure sugar for half as many calories (that is half as much sugar). If such blends found ready consumer acceptance across a number of countries, global sugar consumption would be negatively affected.

The development of the most prominent sweetener, aspartame, deserves special attention. Currently, aspartame is used in an array of food products, most notably diet soft drinks. The development of aspartame, in part, has been dependent on its high domestic U.S. prices, where a patent is still in place. The patent expires in late 1992, which will lead to lower prices and presumably increased demand.

At present, aspartame use in many sweetener-containing products is limited by its inability to withstand heat. Sucralose is stable under heat making it more attractive as a potential sweetener in baked goods. The marketers of aspartame in the United States have filed a petition with the FDA for use of "encapsulated aspartame" which they believe will enable aspartame to be used in baked goods and better withstand high temperatures.

It should be noted, direct competition by high-intensity sweeteners with sugar in baked goods and confections will require bulking agents. Using high-intensity sweeteners in place of sucrose removes some of the beneficial bulking properties that sucrose provides. Replacement of the solids in a formulation must be taken into consideration when developing low caloric products, so that they are equal or superior in mouth-feel to the traditional product being replaced. One much bulking agent which has received considerable attention is polydextrose. It is heat-stable and provides the physical properties of sugars necessary to achieve the texture, bulk, and mouth-feel of traditional foods, but only one calorie per gram compared to four calories per gram for sugar. Polydextrose has been approved in the United States, Canada and in the U.K. for use in baked goods, confections and a number of other uses. Other bulking agents include maltodextrin, sorbitol, and mannitol.

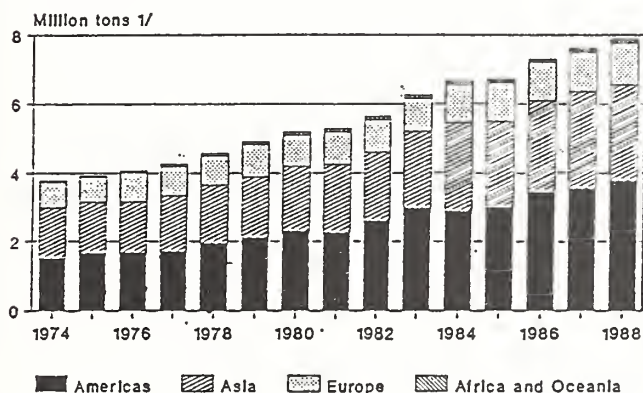
# World and U.S. High Intensity Sweeteners

## HIGH INTENSITY SWEETENERS-- AROUND THE WORLD--Regulatory Status

Product	Sweetener Index (sugar=1)	Regulatory Status Outside the U.S.
Acefulfame-K	200	Approved for use in more than 30 countries. Petitions for approval are pending in Canada.
Allame	2,000	Approval being sought in Canada and a number of European countries.
Aspartame	180	Approved for use in more than 80 countries and in more than 1,700 products worldwide.
Cyclamate	30	Restricted use in Canada and approved in 50 other countries.
Saccharin	300	Approved in more than 90 countries around the world.
Sucralose	600	Applications for approval are pending in Canada, Australia, and the European Community.

Source: Industry sources.

Figure 12  
Global Consumption of High Intensity Sweeteners by Region

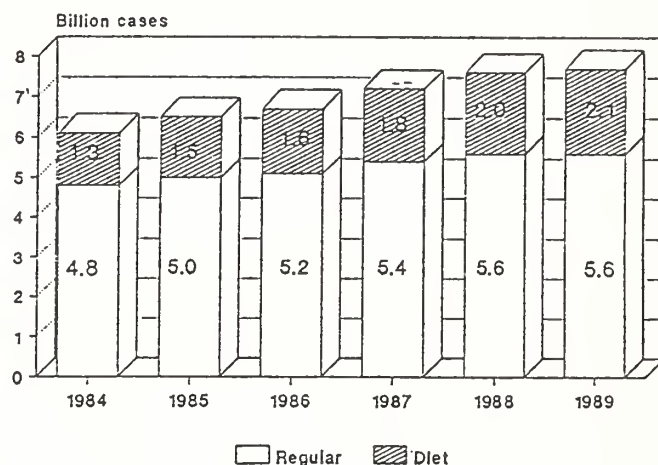


1/ Sugar sweetness equivalent  
Source: Industry sources.

## HIGH INTENSITY SWEETENERS: UNITED STATES --Regulatory Status

Product	Sweetener Index (sugar=1)	U.S. Food & Drug Administration(FDA) Status
Acefulfame-K	200	Approved
Alitame	2,000	Under review by FDA
Aspartame	180	Approved
Cyclamate	30	Banned in 1970, Currently under review by FDA
Saccharin	300	Moratorium on proposed ban in 1977 expires in 1992
Sucralose	600	Under review by FDA

Figure 13  
U.S. consumption of soft drinks



Source: Industry sources.

## Developments to Watch in Structure of World High Intensity Sweetener use

- High Intensity Sweetener use is concentrated in developed country markets--where there is greater diet consciousness than in developing countries.
- In developing countries sucrose is an important calorie source--Is there potential for marketing High Intensity Sweeteners in developing countries in Asia, Africa, and Latin America where populations are increasing fastest?
- What is the "blending potential" around the world for various combinations of Sugar, HFCS, and High Intensity Sweeteners?  
Examples: (1) Sugar and Aspartame; (2) Aspartame and Saccharin; (3) Crystalline Fructose and Aspartame

## U.S. HIGH INTENSITY SWEETENER MARKET-- Developments to watch in the early 1990's

- Regulatory--Sucralose approval, possible cyclamate re-approval, and approval of encapsulated aspartame
- New Products--High intensity sweetener inroads into baked goods and other products requiring "bulking agents" --(i.e. polydextrose)
- Competition--Encapsulated aspartame vs. sucralose vs. sugar --What will happen in 1992 when the patent on aspartame by Nutrasweet runs out?--HFCS vs. Aspartame in the soft drink market.
- Blending--Potential of blending of various high intensity sweeteners in the U.S. market--with HFCS, Crystalline Fructose, Sugar, and other high intensity sweeteners (saccharin and aspartame, saccharin and cyclamates)



**Key Developments**  
**Important to High Intensity**  
**Sweeteners**

In December 1992, the Nutrasweet Company's patent on aspartame production in the United States runs out. The price for aspartame will almost certainly drop and competition will intensify as occurred in Europe and Canada. The price of aspartame will likely drop from the current 30-40 cents a pound sugar-sweetness equivalent to a level close to production costs, perhaps, 10-15 cents. Aspartame could then compete with other sweeteners on a cost, rather than calorie basis.

To date, aspartame has enjoyed its greatest growth in the soft drink market. The HFCS share of the beverage market could be the most vulnerable. Using an 18 cent selling price for HFCS-55 and a 10 cent production cost for aspartame it is likely soft drink manufacturers would find it more profitable to produce and market diet soft drinks using aspartame. Some market analysts believe diet soft drinks could capture one-half of the soft drink market by 1995 compared with 11 percent in 1980 and 27 percent estimated for calendar 1990.

It is also important to note one well-known market analyst who views 1 share, believes major soft drink companies will experiment with blends of aspartame, HFCS, and sugar, with optimum levels of each in a particular brand being determined by cost per unit of sweetness, availability, caloric content, perceived health hazards, mouth-feel, preservation of taste, and shelf life.

**In Summary--**The three major components of world and U.S. sweeteners--Sugar, HFSS and/or HFCS, and high-intensity sweeteners--are beginning the 1990's in a dynamic state of change in terms of production, consumption, and to varying degrees, trade and price. It is apparent around the world and in the United States, there is likely to be increased interaction among these three major components either as complementary sweeteners in different uses or as substitutes, and perhaps as "blends" in the same product. As a sweetener analyst it is becoming increasingly clearer to me that we will need to understand where all three components are headed--plus their interactions--if we are to more fully understand where the world and U.S. sweetener industries are headed, as we move through the decade of the 1990's. Hopefully this presentation and paper provides a source that will help this process.



# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

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## **CHANGING STRUCTURE AND CYCLES IN THE WORLD SUGAR INDUSTRY**

**John A. Desmarchelier**  
**General Manager, Australian Sugar Milling Council**

### **Review**

The cyclical nature of the world sugar market, superimposed on a steady positive trend in global consumption, rarely conforms with theories of economic equilibrium.

Although structural changes are in place, the market remains cyclical in the long term. Four major changes will influence that cycle over the next decade: economic changes in East Europe; the oil crisis; GATT negotiations; and the declining importance of "special arrangements". Intervention has dampened the current cycle. Trade liberalisation (if achieved) and concentration of exports are likely to improve the market's competitiveness and responsiveness to change.

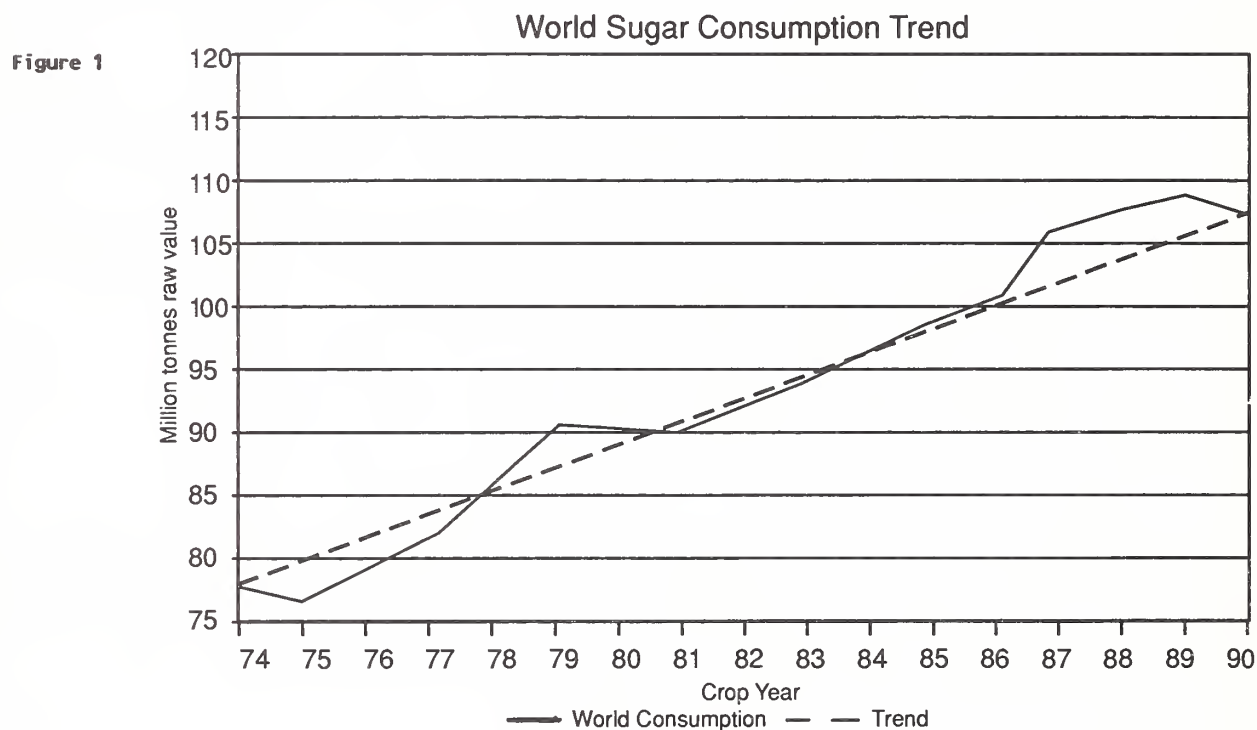
### **Market Characteristics**

Economics revolves around cyclical behaviour. Recurring supply/demand imbalances, and consequent variations in stocks, are reflected in volatile world sugar prices. The nature of the sugar market is characterised by short peaks of high prices and relatively long periods of low, even depressed, prices. Speculative activity contributes to volatility. Stabilisation through International Sugar Agreements (ISA) has failed.

The world sugar market is rarely in economic equilibrium. This stubborn resistance of the sugar market to follow rules of economic theory has many causes: the small proportion of sugar that is traded; lagged supply response to price fluctuations; production which is more related to political or socio-economic factors than price; government intervention; national desires for self-sufficiency; fixed capital investment. Many domestic sugar policies are protectionist: usually with the result of keeping in place industries which would otherwise have declined (USA and Japan); or expansionist (EC).

A further characteristic of the market, beyond physical balance, is the importance of non-sugar participants as suppliers and buyers of price cover through futures' markets. Over the last decade there has been a most rapid growth of speculative and fund involvement. Together with normal hedging operations, this involvement now has trading volumes on futures' markets at twenty times the trade in the world free market.

**World sugar consumption** is the function of a number of factors including population growth; real income per person; retail prices; non-price rationing; and the availability of substitutes. The trend has been steadily positive over a number of decades recording a growth in the order of 2.0m. tonnes or more annually. (Figure 1).

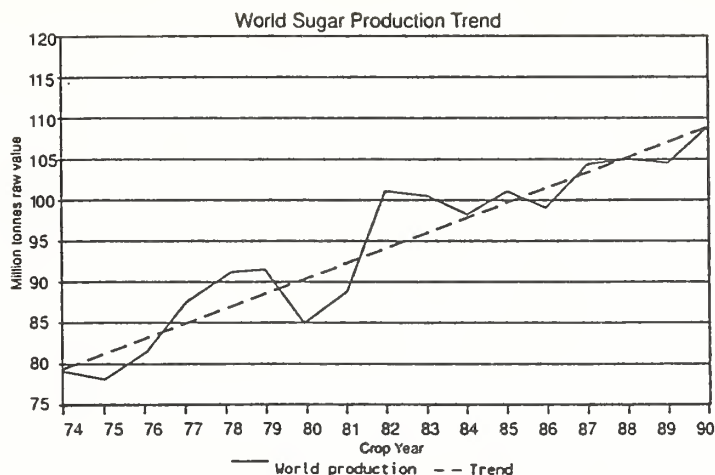


**Global production of sugar** doubled between 1960 and 1985. Based on present projections, production could "top" 200m. tonnes within 30 years. Production is more variable than consumption. For example, for the period 1965 - 88:

- The largest annual increase in production was 9.2m. tonnes (1981); the largest decrease 4.9m. tonnes (1983); and
- the largest annual increase in consumption was 5.2m. tonnes (1987); the largest decrease 2.9m. tonnes (1975). (1)

Figure 2 shows the world sugar production and trend from 1965 to 1988.

Figure 2



**Price response instability** is essentially a characteristic of the residual nature of the market where incremental changes in demand or supply, or shifts in government policy, tend to have a disproportionate effect. Countries' responsiveness to price changes is conditioned in five ways:

- domestic policies insulate producers from world price changes;
- currency movements render US dollar prices more or less attractive when translated into domestic terms;
- differences in cost structure;
- relative attractiveness of sugar as a crop;
- time lag between planting and harvesting.(2)

### Stock/Price Ratio

The relationship between sugar stocks and price is non-linear and the intensity of price response varies to supply/demand disruptions at different price levels. One of the most remarkable features of the present market is the changing perception of the stock/consumption ratio as an indicator of price. Apart from the difficulties of measuring stocks and the arguments about visible/invisible stocks and under/over recording, the "formula" itself has altered, and the market can maintain a much lower stocks-to-consumption ratio than was thought possible, without a severe price rise:

- Inventories held by refiners tend to be smaller, a consequence of higher interest costs and better communications.
- Some exporters provide storage for end-buyer and prompt shipment. Reliability of supply to major destinations has lessened purchasers' dependence on "spot".
- Trade is a smaller proportion of world production.
- Self-sufficiency ratios are higher in some developed importing countries.

Other factors which have a considerable influence on the price are **macroeconomic variables** such as exchange rates, real interest rates, inflation and the relative price of other commodities. Also of decisive importance are **expectations**.

### **Structural Changes**

The "cyclicalist" (one who reckons on cycles and who recognises cycles in the course of phenomena) expresses the belief that the sugar market years of low prices will be followed by a "boom" and, in time, the high prices will run into lows. The "structuralist" (one who perceives the arrangement and mutual relation of the parts of a complex unity) contends that the world market has changed and with it the strong influence of "bulls" and "bears".

Five main reasons are advanced for the view that the world sugar cycle is elongated and that world price peaks will be lower absolutely than past peaks. **First**, there is the increased importance of the speculative element in world futures' markets.

"The change in the structure of futures markets from being principally trade user oriented to have a major speculative involvement (particularly in the USA), has meant that an impending tightening in the physical availability of sugar for the world market is signalled in advance by a surge in futures prices. The result is that the consequent response, in terms of a rise in physical production, is brought forward due to the movement in futures prices, while spot physical prices are still reflecting the current market balance." (3)

The "market" allows producers, users and traders to exercise judgement within the three dimensions of balance, price and time. While supply/demand sets market parameters; and stock/consumption ratios impose limits; the key element is the availability of money. Over the last decade, the strengthening position of non-directional sellers, such as Thailand, Brazil and EC, which has enabled traders to offer more physical sugar, and the improved financial facilities for investments through futures' operations, have greatly improved market liquidity. While in theory this opportunity to optimise and regulate in the pricing and sale of sugar well in advance could curtail a price boom and cause the period of low prices to be shorter, the essential speculative element, which provides depth to the market, also stimulates short-term fluctuations. In respect to variability in the current year, it was the open interest in the N.Y. No. 11 that swelled to 185,000 contracts in early May, suggesting a speculative interest, that pushed prices beyond supply/demand determinants. The over-expectation was followed by over-reaction on the rapid withdrawal of funds.

The problem of analysis is perhaps that there are two different commodities - white and raw - with a much higher proportion of the



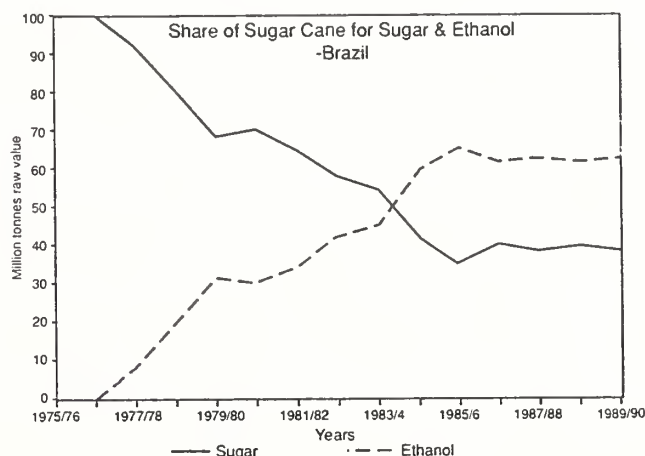
former conducted through traders compared with the latter. (The ratio of the two traded products is about 36:64). Also, while there is a concentration of trading houses for raw sugar (particularly following the decline of the US market), there remains a strong network of trading houses for white sugar. While there is intense competition in trading white sugar, the special relationship between some large trading houses and particular major exporters or importers has not produced the same intensity in trading raw sugar. (4)

The **second** reason advanced is that there are major quantities of sugar cane being used for alternative products, in particular power alcohol in Brazil and non-centrifugal sugar production in India. A small proportion of cane diverted to other uses could have a big impact on the residual market.

In Brazil, of a total cane crop of 240m. tonnes, only about 3% is being directed to export sugar. In India, of a total cane crop of 210m. tonnes, less than 50% is utilised in factories manufacturing centrifugal sugar. However, as we now know, Brazil has an alcohol problem! In the world's largest producer of sugar cane, the sugar/ethanol permutations appear endless. Over 4.5 million Brazilian cars run on alcohol engines; currently the country faces a deficit of 800m. litres of ethanol; and the Middle East crisis has caused a re-assessment of the ethanol programme, especially as 50% of its oil needs are imported with Iraq the major supplier. It should be noted that Brazil has a long term declining trend in sugar production; and domestic consumption is rising. Figure 3 shows the shares of cane in Brazil for sugar and ethanol.

India, a major sugar importer since 1983/84, appears on the other hand, to have "got it right" but it remains to be seen whether that success will continue. A package of measures including incentives for early shipment and for later delivery, coupled with favourable weather conditions, has led to a surge in production of almost 2.0m. tonnes to 11.0m. tonnes.

Figure 3



Source: LMC (10)

The **third** reason advanced is the emergence of the EC as a major exporter of beet sugar with a shorter period of production response to price signals. This is linked also to the world white sugar trade which, after a period of rapid growth associated with the availability of EC whites, has now stabilised at around 36% of world sugar trade. While there was a modest production response from the more efficient of the EC producers to strengthening prices later in 1989, it has been less than anticipated overall, the main reason appearing to be the relatively lower price signals in domestic currencies flowing from the weaker dollar.

The **fourth** reason advanced is availability of alternative sweeteners. While HFCS growth post-1975, as a direct consequence of US sugar policy, affected world sugar consumption in the 1980's, and takes up 6.4% of world sugar and HFCS production, the increased rate of usage has declined. The underlying trends in the demand for sugar and for sugar plus HFCS are similar, the former resuming a normal growth rate as the period of rapid growth of HFCS has passed.<sup>(5)</sup> Had HFCS production not occurred, world sugar consumption would now exceed 115m. tonnes.<sup>(10)</sup> HFCS in USA and Japan remains basically insensitive to world sugar prices.

Intensive sweeteners are subject to continuing interest by manufacturers but their application is limited by food regulations as well as inferiority in taste and application. The evidence to date appears to indicate only modest market penetration coupled with the creation of a new "diet" market segment especially for soft drinks. They are no substitute for cheap food in poorer countries.

The **fifth** reason promoted by the "structuralists" is that consumption growth is increasingly concentrated in developing countries, whose price sensitiveness would be reflected in reduced demand. Despite the changing patterns in world demand - for example the proportion of world sugar consumption by developing countries has increased from around 45% in 1974/75 to around 65% currently - and developing countries account for some 75% of total sugar trade - world consumption has continued to grow at around two million tonnes annually during the 1980's.

TABLE 1  
ANNUAL GROWTH IN WORLD SUGAR AND CALORIC SWEETENER CONSUMPTION

	<u>Consumption growth</u>		<u>Growth rate</u>	
	Sugar Million Tonnes	Sugar, HFCS Million Tonnes	Sugar %	Sugar, HFCS %
1951-59	1.99		5.2	
1960-69	2.01		3.6	
1970-79	2.11	2.48	2.7	3.2
1980-87	2.15	2.50	2.2	2.5
1987-89	2.56	2.80	2.5	2.6

Source: B. Borrell from F O Licht (6); and LMC (10)

As for most "soft" commodities, consumption of sugar is related to incomes growth. World sugar prices have little effect, because of domestic pricing policies. Income growth has been the main determinant of sugar consumption growth over the last three decades and is expected to remain so in the 1990's. In particular, low income countries have a high propensity to consume more sugar as per person incomes rise.(7) Asia, the source of much sugar consumption growth in the 1980's, should continue as the main base of consumption growth in the 1990's, with the strong rise forecast in per person incomes, although this could be checked by the slow down flowing from anti-inflationary policies currently being adopted world-wide.

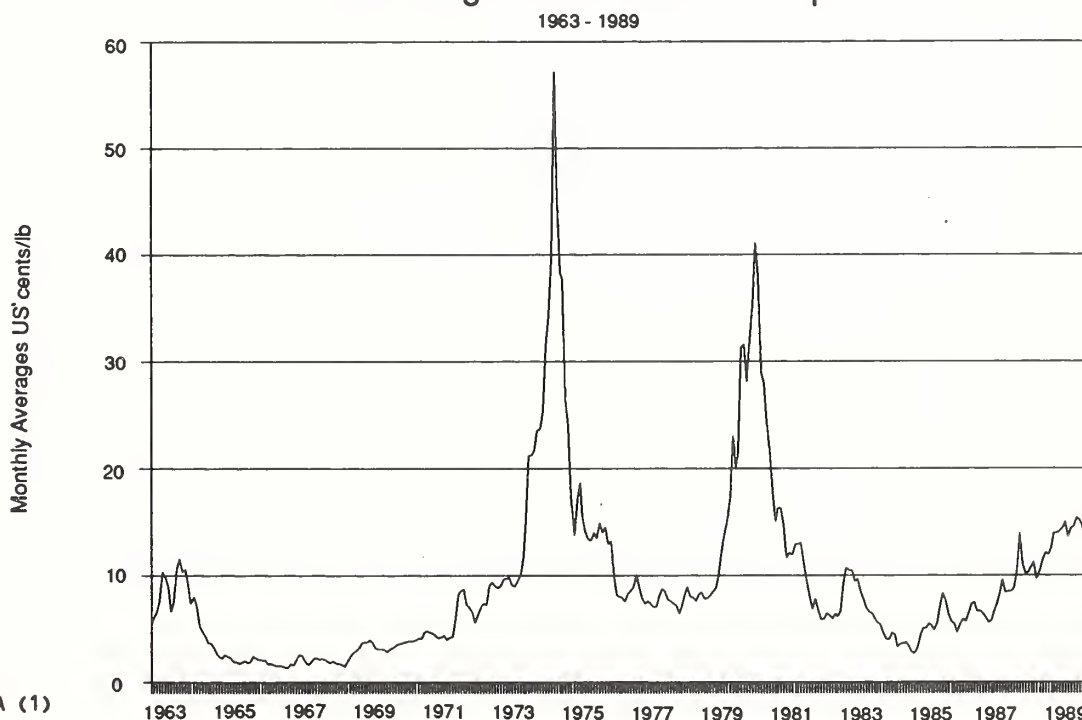
As an interesting comment on the price responsiveness of developing countries, in respect to the 1980 price "spike", net imports into Asia fell only slightly in 1980 from the two previous years; and imports into the African continent actually rose, so that the total of the two continents was almost unchanged over that period. Conversely though, intervention by the Chinese Government has severely curbed imports in the current period.

### Price Cycle is "Alive"

The traditional sugar cycle follows a broad pattern of short term peaks (or spikes) followed by longer periods of low (or depressed) prices. Refer to Figure 4.

Figure 4

### World Sugar Price NY No. 11 Spot





While there were changes of a structural nature over the last two decades, the extreme movements of the market in the 1980's can best be characterised as "cyclical". The most recent occurred in the early 1980's following two major shortfalls in the 1979 and 1980 crops resulting from bad weather in the USSR, India, Thailand and Cuba. Stocks fell and prices surged to 41 cents lb in October 1980. Record production followed, prices fell to 8.4 cents in 1982, and to 4 cents in 1985. Since 1985, surplus stocks have steadily declined and prices have gradually risen. (The 1973/74 peak was associated with a similar response to a production deficit).

In the context of the relatively steady world price over the recent eighteen months and the peak that did not develop, it is tempting to examine what might have been and could yet develop if some of the recent "major switches" had coincided or were to in the near future, to intensify the cycle:

- Thailand's dramatic rise in exports from just under 2.0 million tonnes in 1988 to 3.1 million tonnes in 1989.
- China in 1989/90 reduced imports by 60% from 2.9m. tonnes over each of the two previous years.
- Mexico's shift from an exporter of raws to become in 1990/91 a major importer of up to 1.3m. tonnes of whites and raws.
- India's move from an importer of whites towards pressure to allow export reasonable quantities.
  - In 1984/85 India's production fell by almost 2.0m. tonnes and the consequent import of 1.8m. tonnes in 1985 helped to lift the world sugar cycle.
- In 1990/91 beet sugar production in the USA rose 11% and cane sugar production fell by 9% leaving a net growth of 1%.
- Australia's production in 1990, despite a 5% expansion in area to cane, fell by 12%.

That the market remains sensitive and price responsive is clearly reflected in the decline in price in mid-1990 with the advice of revised global estimates. On 4 May E.D. & F. Man revised their projected deficit for 1989/90 from 1.46m. tonnes to 0.26m. Prices immediately fell. On 29 May F.O. Licht's third estimate indicated a 0.69m. tonne surplus instead of a 0.16m. deficit. (The withdrawal of funds from the market exacerbated the trend).

In order to bring those realities into focus and the potential they have to influence the world cycle, but for the improved crops in India and USSR in the latest crop year, world-wide there would have been a further run down in world stocks in excess of 1.0m. tonnes. At the subsequent price response we can only speculate!

### **World Trade Pattern**

According to a World Bank analysis (8) over the period from 1961 -



86, total world imports increased from 19.5 to 27.1m. tonnes; but over this period the share of the top 10 importing countries declined from 79% to 61%, a manifestation of the increasing number of countries participating in the import trade. Over the last decade the share of imports by the major 5 importing countries has declined from 55% to 47%. The influence of economic development and economic growth on imports, is seen in the increased imports among oil-exporting countries from the mid-1970's (which also coincided with the EC drive towards "self-sufficiency"). White sugar has since stabilised at about 36% of world trade.

There has been little growth in the tonnage of sugar traded over the last decade. Global imports, in percentage terms, have declined from around 33% of production in 1980/81 to around 26% in 1989/90. This growth in self-sufficiency has been marked by the displacement of sucrose by alternate sweeteners in USA and Japan. Figures 5 and 6 show the ratio of world consumption to net trade over the last decade.

Figure 5

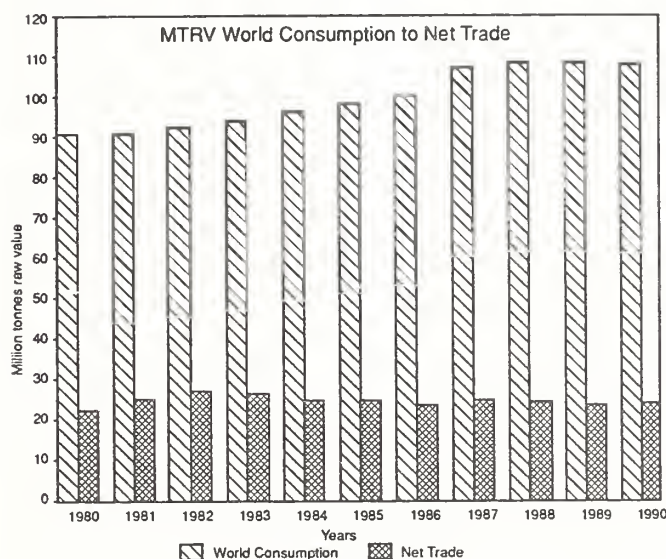
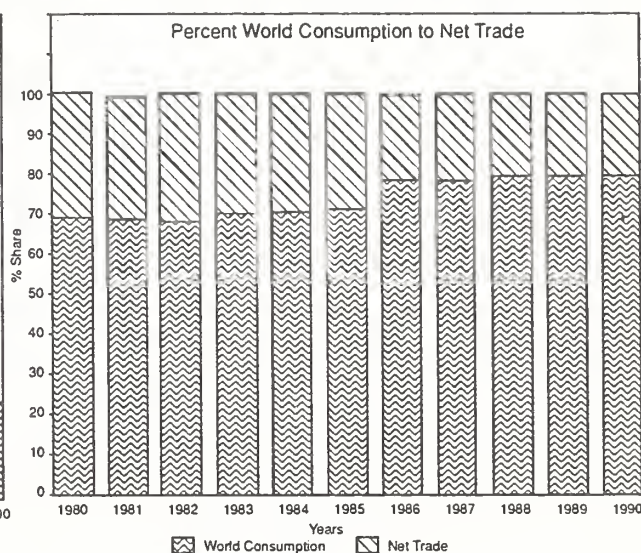


Figure 6



Source: ISO (9)

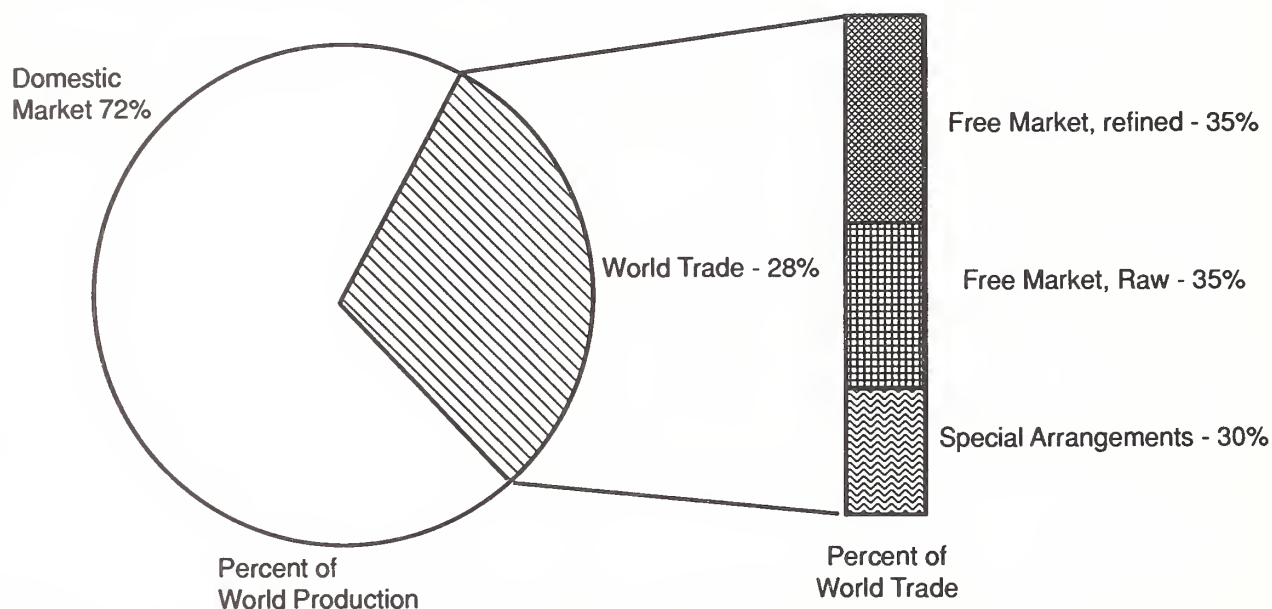
An important feature of the world sugar market has been the "dominance" and increasing concentration of the major exporters - Australia, Brazil, Cuba, EEC and Thailand, which now account for 70% of world sugar exports compared with 47% in 1971. Their share of "free market" trade has grown from 36% in 1971 to 77% currently. Concentration is expected to continue, as a matter of economic necessity, with planned expansion of production from Australia and Thailand in particular, as well as increased net availabilities from a united Germany. (If there is an expectation with respect

to the elongation of the world cycle [prices under pressure for longer periods]; and a reduction in the intensity of peaks [lower funds for reinvestment]; then this concentration would intensify). It is interesting to note from LMC studies that the five low cost beet producers include important exporters: France, Belgium and West Germany; and that the major cane exporters had lower costs than the low cost beet producers, viz: Australia, Brazil (Centre South), Cuba and Thailand.

Associated with this trend is the loss of competitiveness among many of the world's smaller traditional sugar exporters. Factors include limited scale; distance from markets; financial investment problems; and an underlying worsening of technical performance, which is reflected in production costs.(3)

Figure 7

### Structure of World Sugar Trade



Based on estimated 1986-88 values

Source: USDA (1)

There are four major changes that will influence the world sugar market cycle over the next decade.

#### 1. East Europe

Recent developments in Eastern Europe clearly demonstrate the vulnerability of sugar demand to political and macroeconomic factors. Generally the reduction in agricultural support and the move towards market-oriented economies, together with some shortage of supplies, will escalate prices; and per capita consumption,

already very high in many previously centrally planned economies, is expected to decline slightly.

While the current causes of shortages in supplies - drought in parts of Eastern Europe and poor deliveries from Cuba - are only short term, factors adversely affecting the production of sugar in the medium term are already in place. Problems include higher fuel costs which must be met in hard currency; financial problems for farmers moving towards the new economic system; break-down in patterns of supply and distribution; and transfer of some areas under beet to food crops or cash crops. In the USSR, the world's largest sugar beet producer, the delay in tackling structural problems implicit in a planned economy has led to a deterioration in economic performance; and this creates disruption to harvesting, transport and, ultimately, processing.

The difficulties facing many East European countries are fundamental. While there is little experience among economists in the transition from centralised planning to free market economies, adaptation goes beyond the transfer of technology and management. Sugar production is quite complex involving planning, incentives, contractual payments, transport, organisation, manufacture, storage, finance and markets; and it would be naive to believe that complex "free market" economics can be readily adapted. It is more likely that there will be quicker agricultural adjustment to "simple" activities such as grains than to "complex" production such as sugar which will, as a consequence, be more in jeopardy in the future.

However, situations differ. It appears that the exporting group which includes Hungary, Czechoslovakia and Poland have the political and managerial capabilities or potential to cope with change. In other countries, such as USSR, Yugoslavia, Bulgaria and Romania, production could decline because of poor logistical management.

## **2. Middle East Tensions**

Just as the fall in oil prices following the 1979 oil crisis was an important factor in the sustained growth and low inflation experienced by most developed countries during the 1980's, the price of oil emerges as a major determinant of the world's economic prospects in 1991. While higher energy costs will intensify the anti-inflationary policies of developed countries and impact on the growth in world trade, the implications for economic growth are less severe than in the past. Industrialised countries have become more energy efficient. Oil accounts for only 43% of total OECD energy use compared with 50% in 1979. Also, in real terms, oil at \$US40 per barrel is cheaper than during the 1979 crisis.

Within the sugar industry, while all agriculture and transport is



affected similarly, oil costs impact differently on cane and beet factory operations: fuel and chemicals comprise 30 - 33% of beet factory costs; but less than 5% of cane factory costs. AT the same time beet factories have learnt to live with higher energy prices. For example, French beet factories have halved their energy requirements over two decades. (10)

Although the oil crisis in the Gulf has the potential to distort sugar trade, on balance, there will be little net effect. Much depends on the duration of the crisis. In the short term: trade sanctions on Iraq and Kuwait, if effective, could restrict the flow of white sugar imports from the EC of 300,000 tonnes; on the other hand Nigeria and Indonesia have the potential for greatly increasing imports. Also, a number of countries such as Mexico, Egypt, Algeria, Iran and the Soviet Union could respond to higher income with increased imports of sugar.

### 3. GATT Negotiations

The broad aims of GATT, freer non-discriminatory trade, are clear. Unfortunately, in the development of GATT over four decades, agriculture and textiles, which have assumed much greater importance in the market place, have been inadequately dealt with under GATT. The worst offenders to exploit the weaknesses in GATT are the EC, Japan and USA.

The problem has grown to the extent that the OECD has calculated that consumers and taxpayers in developed countries last year paid out \$US 250 billion in artificial prices and taxes, to support the farming sector. In the EC in 1989 some 38% of farmers' income came from government support; and in the US, the figure was 27%. Assured prices for farmers have led to massive over-production. In export subsidies alone, which are the most pernicious of trade distorting measures, the EC pays out \$US 12 billion a year and the US \$500 million.

Success in Geneva would lead to the strengthening of commerce and trade, from the gradual reduction in barriers, protection and support measures. Failure could provoke a vicious round of protectionism and possibly trade wars. For sugar the consequences for GATT would be, on the one hand, a modest expansion in trading opportunities and improved competitiveness in the market place; or, on the other hand, continued protectionism which has seen: the USA decline from the world's largest importer of free market sugar to become a net importer of 1.4m. tonnes annually; the EEC change from a net importer of sugar to become the world free market's largest exporter of sugar; and Japan's imports of sugar steadily decline.

[Unfortunately the prognosis for a successful outcome in Geneva has been dimmed by the failure of the EC Ministers to craft a joint approach to reducing agricultural protection].



Several recent studies have analysed the consequences of world sugar market trade liberalisation; and these are summarised by R Lord and R D Barry (1). Virtually all of these studies have found that the world sugar price and the volume of sugar trade would rise following trade liberalisation. Based on the authors' best judgements of the analyses had trade liberalisation been in effect over 1986-88: world sugar prices would have been higher (about 10-30% over its long run average); and global sugar production would not have altered. However significant changes would have occurred in individual countries, e.g.

- Most USA cane areas would have found it difficult to compete and overall production could have fallen by 30% (2m. tonnes).
- EEC production would have fallen by about 25% (3m. tonnes).
- Production in Japan would have ceased.
- Australia's production would have risen by 1.0m. tonnes to 4.5m.
- Brazil's production would have been 20% higher.
- Cuba's response would be slight, an increase of perhaps 10% (0.8m.).

#### 4. Special Arrangements

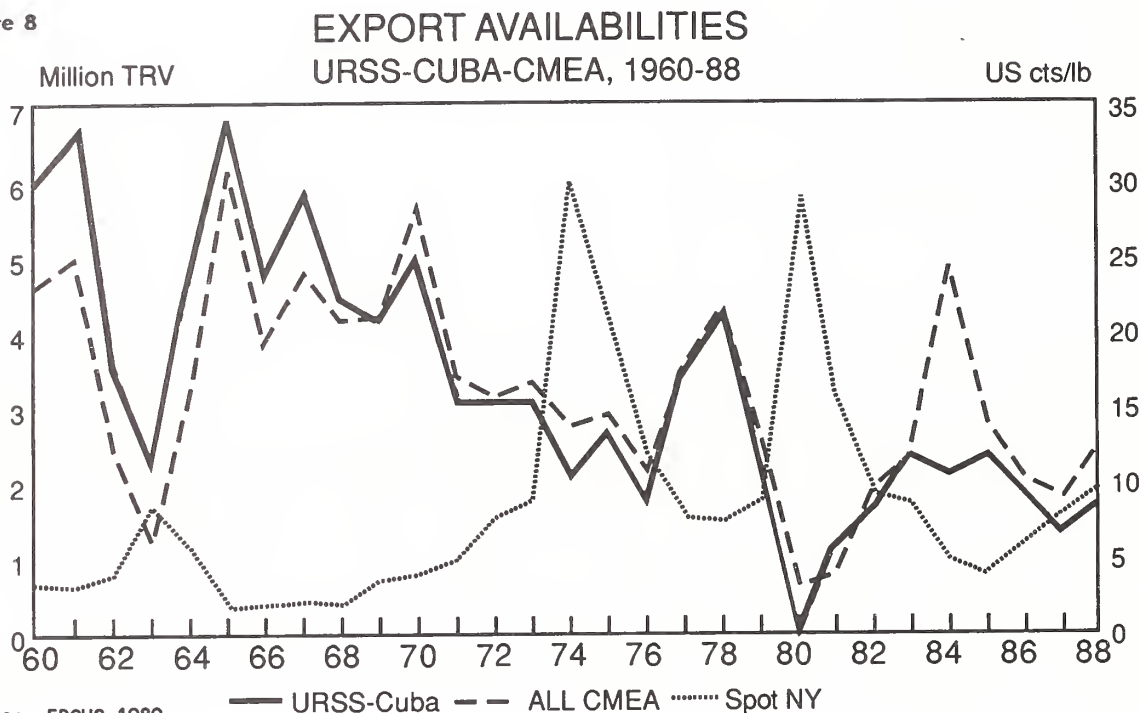
Any reduction in protection and liberalisation of trade flowing from a successful outcome of the GATT negotiations in Geneva should be reinforced by a declining significance of "special arrangements", which have played an important role in the development and direction of trade flows. In 1970 three main arrangements represented over 50% of world sugar trade covering about 10.5 million tonnes. By 1980 "special arrangements" represented only 21% of world trade following the suspension of quotas under the US Sugar Act in 1974 and the cessation of the Commonwealth Sugar Agreement after the UK joined the EEC; this was replaced by the Lomé Convention covering 1.4 million tonnes. In 1982, the USA re-introduced quotas to control the level of imports; but these have been subsequently declining.

Into the next decade special arrangements will have a declining significance, increasing opportunity for a wider world market and more competitive trade. Import quotas into the US are expected to decline. The dominance of private enterprise and the free market in the world sugar economy and economic reforms in the Soviet Union which have undermined the exchange of goods system are forcing Cuba to take a more realistic view of its international trading relations.

The significance of modification in the structural relationship between Cuba and USSR should not be overlooked. As P. Du Genestoux pointed out at the LMC Conference in November 1989: "Looking at it in a long term perspective one could validly support the argument that substantial deficit in the socialist sugar world (bad crops in USSR, Cuba or both), have coincided with, or lead to, the

recurrent "boom" in the sugar market." Figure 8 shows "socialist" export availabilities in relation to the world price from 1960-1988.

Figure 8



### World Bank Forecasts

Against these factors in a "world of change" there is some comfort in referring to World Bank projections as they may affect sugar consumption and trade. "Demographic models suggest a substantial change in patterns of population growth in the 1990's: a further significant slowdown in the population growth of the industrial countries, and a rapid aging of their populations; and continuing rapid population growth in the developing countries, with youth becoming the dominant segment of the population." (8)

According to the World Bank, **world sugar supply** is projected to grow at 2% p.a. from 1987, to the year 2000. The bulk of this growth is expected to be concentrated in developing countries. A very high proportion of that growth is projected for Asia at a rate of 3.4% p.a. Much of this supply will originate from China, India, Indonesia, Pakistan, Philippines and Thailand. For the industrial countries, including EEC and USA, growth will be less than 1.0% p.a. (8)

**Global consumption** is projected to grow at 1.7% p.a., to 130.7 million tonnes in 2000. Sugar consumption is expected to grow fastest in the developing countries, with Asian consumption

dominated by China and India, and Latin America dominated by Brazil and Mexico.(8)

**Trade in sugar** is expected to rise over the decade by 0.9% p.a., about half the rate of rises in consumption, to reach 31.6 million tonnes in 2000. Among the developing importers, China is expected to remain the lead country with imports projected to grow at 6.2% p.a. to 4.3 million tonnes in 2000. USSR imports should continue to grow at 1.9% p.a. to 6.8 million tonnes.

In projecting commodity prices in 1988, over the next decade the World Bank assumed that the major thrust of the industrial economies is to remain anti-inflationary. As it is likely that "equilibrium" will be achieved at lower stock/consumption ratios than in the past, if those projected prices do prevail, there will be room in a more liberalised market only for the more efficient exporters. Medium term, the World Bank assesses that there is a 30% chance of prices being above 20 cents lb each year between 1991 and 1993. Without concerted action by low cost exporters to reform policies to allow producers to respond directly to world prices, supply shortfalls and an 18 to 24 month price boom are likely before 1995. (11)

TABLE 2  
SUGAR PRICE PROJECTIONS

	In 1985 Constant \$	In Current \$
1990	300	455
1995	224	406
2000	254	575

Source: World Bank (8)

**In summary**, by the year 2000 global sugar supply and consumption should be between 131 - 133 million tonnes with world trade, at 31.6 million tonnes, equal to 24% of consumption, and prices of about 26 cents lb, equal to 11.5 cents lb in 1985 dollar values. An 18 month price boom is likely before 1995.

\*\*\*\*\*

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## MARKET STRUCTURE ISSUES AND THE U.S. SWEETENER INDUSTRY

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Market structure issues have affected the U.S. sweetener since the days of the sugar trust which exercised monopoly power from 1889 to 1921. There is still reason for concern about industry concentration today. Mergers, acquisitions, and plant closings have reduced the number of firms in all segments of the industry. Several leading firms have made acquisitions to become more national in scope. For example, Imperial Sugar, a Texas cane refiner acquired Holly Sugar, a great plains and California beet sugar processor. Savannah Sugar Refining Company acquired Colonial Sugars, a competing cane refiner and Michigan Sugar Company, a beet processor. Refined Sugars & Syrups, owned by Tate & Lyle, acquired Western Sugar by buying assets of the bankrupt Great Western Sugar Corporation. Now the British refiner, Tate & Lyle, the world's largest sweetener company, along with Redpath Industries, its subsidiary Canadian cane sugar refiner, has acquired Amstar Corporation the U.S. largest cane sugar refiner, although this required that Tate & Lyle sell the Refined Sugars' cane refinery. Tate & Lyle already owned A.E. Staley, the U.S. second largest corn sweetener company and retained Western Sugar, the fourth largest beet processor. Concentration in the U.S. industry is increasing and at the same time there is virtually no investment in new sugar production facilities. So new entries, except corn sweetener plants, are not a factor. This sets up the classic conditions for the exercise of oligopolistic market power.

The market for sweeteners is characterized by a small retail sector and a large institutional and industrial users market. The sweetener market is also characterized by increasing concentration. Mergers of sweetener using companies to form large food firms, such as, RJR-Nabisco, and Philip Morris-General Foods, have reduced the number of industrial customers. Hence, the oligopolistic sweetener industry tends to face an oligopsonistic sweetener user market.

This paper will examine market structure issues by looking at the structure, conduct, and performance of the U.S. sweetener industry in each of its segments: beet, cane, and corn sweeteners. Structure will be examined in the context of whether there is sufficient concentration to allow exercise of market power. Conduct will look at how pricing is done in industry segments. Performance will be discussed using the price-cost-margin as a performance measure where available.



## Structure of the U.S. Sweetener Industry

### Growers

The segment of the U.S. sugar industry that most closely resembles the standard model of perfect competition is the beet sugar and cane sugar growers. Corn growers are characterized by perfect competition. About 9000 farmers grow sugar beets, generally in rotation with other crops, and such large numbers tend to imply competition. However, sugar beets are grown under contract to beet sugar processors which include terms on quality and price and participation in the proceeds of the sale of the final refined beet sugar product. Growers do not plant sugar beets without a participating contract, so a good case can be made that beet growers have been somewhat integrated with the beet sugar companies.

Similar circumstances now affect the sugar cane growing industry. The Hawaiian sugar industry is integrated with 98 percent of production coming from fields owned by the cane milling companies. There are less than 100 independent growers dealing with a single cane processor. In Florida, the U.S. Sugar Corporation owns its own fields and cane mills. Most other Florida growers have a very close relationship with processors, either through ownership or cooperative structure. The Texas sugar cane growers have one cooperatively owned processor. The Louisiana industry is largely characterized by grower-owned cooperatives, although there are still some private cane mills. However, sugarcane is not harvested without certain knowledge as to which cane mill will grind it.

All this implies that the growers of sugar crops can be assumed to have close relationships with their first processors. Unlike other crops, sugarcane and sugar beets are not produced for sale at whatever the market will provide, but with certainty as to who will accept delivery of the crop. Generally, there is a basis for the grower to assume he will get a share of the proceeds that the processor will get when the sugar is sold.

### Cane Sugar Millers

Cane sugar millers grind perishable sugarcane to make raw sugar which is easily stored and transported. Table 1 shows data on cane sugar milling firms in five U.S. regions. Structure issues are best discussed by region.

Florida.--There are seven cane mills in Florida operated by six companies. The United States Sugar Corporation is the largest company with two mills accounting for nearly 40 percent of Florida production. Florida sugar is mostly marketed by the Florida Sugar Marketing and Terminal Association, although some sugar is sold to refineries directly on long term contracts. The Association also negotiates contracts with refiners, but by developing its West Palm Beach storage and loading facilities so that it can handle raw sugar traffic by ocean going barge, the Association has expanded the Florida industry's ability to market sugar to include markets beyond the nearby Savannah sugar refinery. Sales of Florida sugar to New York or New Orleans refiners are now common. The Association has greatly improved returns for Florida processors and growers by astute marketing of sugar. The Association has also enhanced the industry's ability to take advantage of government programs, such as price support loans. With the Association responsible for marketing sugar at the margin, the individual Florida firms are not in competition, but rather the whole Florida industry, vis-a-vis processors in other regions.

Hawaii.--Hawaii has 12 cane mills, all of which are owned by the five factors which own the Hawaiian industry: Alexander & Baldwin, Inc.; Amfac, Inc.; C. Brewer and Co., Ltd.; Castle and Cooke, Inc., Ltd.; and Hamakua Sugar Co., Inc. (formerly Theo. H. Davies & Co., Ltd.). The sugar cane growing and milling companies owned by the five factors own California and Hawaii Sugar Company (C&H) with its refineries in Aiea, Hawaii, and Crockett, California, where almost all Hawaiian sugar is marketed. C&H is a grower-owned cooperative, so each company participates in any C&H profits in proportion to the sugar sent to C&H. As the only cane refinery on the west coast, C&H sells primarily in competition to beet sugar, but generally obtains a premium price because of the perception cane sugar is better than beet sugar. C&H is in effect the marketing agent of the Hawaiian cane mills. The Hawaiian mills are not in competition with each other, but rather with other cane sugar sources and beet sugar processors.

Louisiana.--Louisiana has 21 cane mills, many of which are grower-owned cooperatives. The Louisiana industry has not formed a marketing group so these mills tend to market their sugar to local refineries in a competitive manner. The mills also are in competition with imported sugar which along with other U.S. cane regions can also supply Louisiana cane sugar refiners. Louisiana cane refiners tend to get low-priced raw sugar and are very competitive in the pricing of the refined sugar products.

Texas.--Texas has one grower-owned cooperative sugar cane mill. This mill markets the entire Texas cane sugar crop generally through a long term contract with a cane sugar refinery. Because of proximity, the refinery is almost always the Imperial refinery in Sugarland, Texas.

Puerto Rico.--The Puerto Rican government owns the Puerto Rican sugar industry through the Puerto Rican Sugar Corporation which owns 6 cane sugar mills and two refineries. Puerto Rico receives price support through U.S.D.A. programs, but costs are so high that even with price support the industry is run at a loss. However, losing money on sugar production may be cheaper for the Puerto Rican government than providing welfare for sugarcane company employees. Puerto Rico's most profitable industry is rum manufacture, and molasses is an essential ingredient for rum. The sugar industry provides this feedstock for the rum industry. Puerto Rico is self-sufficient in sugar and still ships some sugar to mainland refineries in competition with foreign suppliers.

### Refined Sugar

Refined sugar is sold in the United States by beet sugar processors and by cane sugar refiners. Table 2 shows daily slicing capacity of U.S. beet sugar processors by firm. However, beet plants are run seasonally so capacity is not necessarily a good measure of comparative size. For example, American Crystal has temperature controlled warehouses which allow beet processing over a longer period. Table 3 shows daily melting capacity of U.S. cane sugar refiners by firm. Beet sugar processors buy sugar beets from growers and make refined sugar which is sold for consumption. The cane refiners buy raw sugar from foreign and domestic sources, remove the impurities through the refining process and sell refined sugar for consumption.

Both beet and cane refined sugar are 100 percent pure sucrose to the extent that they can be tested in laboratories, and are hence, perfect substitutes. But cane sugar always sells at a premium to beet sugar, even to industrial users because

of a consumer perception that cane sugar is superior. The effect is greater on retail sales, where consumers have a choice of beet sugar labeled "sugar" and cane sugar, invariably labeled "cane sugar". Transportation costs tend to encourage sales of a bulky but cheap product such as sugar close to where it is produced. However, the existence of favorable freight rates has Great Plains beet processors shipping growing quantities of beet sugar to the New England sugar market despite the proximity of cane sugar refineries in the area. Cane and beet sugar are sold in competition with each other, so it is appropriate to consider the structure for refined sugar marketing rather than cane and beet refined sugar separately.

Concentration ratios for the refined cane and beet sugar industries have been calculated using estimated beet production by firm and by using melting capacity by plant for cane refiners to project production to create market shares for companies proportional to total U.S. sugarcane and sugar beet output. Actual output data by firm is not available for cane refiners. Combining cane and beet sugar output allows us to show concentration for firms which combine both cane and beet under one ownership.

The concentration ratio for the four leading firms were calculated as well as the Hirschman-Herfindahl Index (HHI) as shown in table 4. The national concentration ratio ranges from 50.78 to 63.53 with a general rising trend from 1983-90. The mergers of cane refiners and beet sugar companies increased the concentration ratio over the period. With the acquisition of Amstar by Tate & Lyle in 1990, the estimated concentration ratio increases to its high of 63.53 percent. A 60 percent concentration ratio traditionally was regarded as a concentrated industry. The HHI for the combined industry was also calculated. Over the period 1980-90 the HHI ranged from 1114 to 1316 which is in the gray area regarding concentration in an industry. Under the more permissive Justice Department guidelines on mergers, no action is taken for against mergers which leave the industry HHI below 1000 but there is action for indexes above 1800. The lower HHI despite the high market share of leading firms reflects the very large number of smaller fringe firms in the refined sugar industry.

These measures of concentration cannot fully reflect the level of concentration in the industry that may face individual customers. For example, customers in the Northeastern United States have had only two firms operating refineries in the region since the Revere Sugar Corporation closed down in 1984. Some industrial buyers have rules requiring that sugar purchases be maintained from at least three sources. For such firms this closure made it necessary to import sugar from southern refineries or western beet sources.

### Corn Sweeteners

There are now six corn sweetener firms which produce high fructose corn syrups (HFCS), although about 12 companies have been involved in the ownership of HFCS facilities since 1974. Data on production by firm is unavailable, but estimates of production capacity by firm and by plant are available. Production capacity has generally been highly correlated with market share for these firms, so it can be utilized for the construction of concentration ratios. Our concentration ratios are based on who controls the marketing of each plant's output, since leasing and marketing contracts are common in the industry. Hence, output of Canadian plants is included since a domestic company (CPC International) controls the marketing of Canadian output which is mostly exported to the United States.



Hubinger markets the output of the Coors plant in Johnston, CO. ADM leases and markets the output of RJR-Nabisco plants. The output of two plants in Montezuma, NY and Morrisville, PA are not included since they have not operated in recent years.

Table 5 shows the percentage share of total capacity held by the top four firms during 1974-88. In 1974, the four-firm concentration ratio begins at 100 percent because only two firms were producing then. The ratio declines to 74 percent in 1981 during the period of peak growth for the industry. The ratio has since risen to 87 percent in 1988 as the industry has matured to where production capacity is sufficient to meet most potential demand.

The HHI dropped from 5000 in 1974 to 1690 in 1981. After ADM leased Clinton Corn Processing in 1982, the HHI has remained above 2000 reaching 2356 in 1988. Justice Department guidelines indicate action should be taken for mergers which raise the index above 1800, which indicates why the case has been pursued against the ADM leasing arrangement. This index is only for HFCS. The 1982 HHI for the corn wet milling industry as a whole was calculated by the Bureau of the Census to be 1721. This compare with an HHI of 2087 based on HFCS production capacity, but there were more firms producing corn syrup than HFCS in 1982. These measures of concentration suggest that the HFCS industry is relatively concentrated.

### Conduct of Sweetener Industry Sectors

#### Cane Sugar Refiners

The literature on firm conduct in the sweetener industry is very limited so analysis of conduct is largely the result of personal observation and experience having worked with industry purchasers and sugar brokers. Only sugar at retail is sold at a fixed price to final consumers. All sugar is sold by refiners at negotiated prices whether direct or through a broker except for sugar sold under tolling contracts. The largest industrial users buy raw sugar and pay refiners to refine it under tolling contracts. The result in economic terms is an example of near perfect price discrimination where the seller is able to capture nearly all consumer surplus from his customers. Almost all sugar would be sold at individual prices to each customer in any case, because of differences in quality, transportation costs, transportation methods, timing requirements, etc. Differences in prices which arise from how big a customer the firm is and of course how eagerly the seller is pursuing the business.

Price discrimination may have a bad name, but perfect price discrimination also suggests efficient resource allocation will occur if the marginal quantity is sold at cost of production. The fact that the lowest prices in the market result from tolling contracts at or near costs of production, would suggest that the cane sugar refining industry may represent such a case of perfect price discrimination with relatively efficient resource allocation.

#### Beet Sugar Processors

Beet sugar processors sell their product at a discount to cane sugar in competitive locations. Competition among beet processors may be more intense than among cane refiners. Beet processors see sugar inventories build with the harvest and feel pressure to unload supplies into the market before the next beet



harvest. If a firm holds out for higher prices its sales will slow until panic selling becomes necessary to empty storage bins before the next harvest.

Beet sellers tend to maintain local customers at market prices and dispose of surplus supplies to distant locations at prices as low as necessary to move product. As a result the Chicago area is famous as a location with low sugar prices because it is where sugar from three major sources--western beet, eastern cane, and southern cane--meet for final disposal.

### Corn Sweeteners

Corn syrup has long been sold at a substantial discount to sugar as a sweetener much less sweet than sugar but with other desirable properties related to its other distinctive qualities. HFCS is the product which the corn wet milling industry has sold as a substitute for liquid sugar. In particular, 55HFCS is a substitute for sugar with similar properties of sweetness. For those who can use it 42HFCS is a bargain sweetener, slightly less sweet than sugar but available at a discounted price because 55HFCS requires additional enrichment processes to increase its fructose content. The marketing departments of corn wet millers are small because sales are primarily a factor of offering discounts to sugar and waiting for customers to call.

When the HFCS production capacity was built to a sufficient level to meet most U.S. liquid sweetener demand, the industry achieved a certain level of maturity relative to the growth period of the 1970's and early 1980's. During the growth period there were cycles of excess capacity followed by tight capacity as HFCS was adopted in ever increasing quantities in soft drinks. With maturity, the corn sweetener industry found that it faced a customer base with relatively high concentration, particularly with recent mergers that have increased concentration among soft drink producers. Further, the demand was highly seasonal resulting in severe excess capacity in the off season.

Customers would use the desire of sellers to book product in the off season to assure purchases at lower prices in the peak season. To discourage this leverage against higher prices and higher profits, in mid- 1985, the largest HFCS sellers announced they would not sell 55HFCS ahead for more than the upcoming calendar quarter. Coming in the period of peak demand in summer 1985, higher HFCS prices were extracted. The real concern was what would happen in the fall quarter when seasonal demand fell. No price announcement was forthcoming for the 4th quarter until late September 1985 when ADM announced a price well above the previous year's low and most other HFCS sellers followed suit. Discounting to these announced prices was limited. A pattern of price leadership and quarterly sales seemed about to be established. These stronger HFCS prices were coming in a period of declining corn prices and lower costs.

The pattern of quarterly offerings for 55HFCS has not changed since it was begun, and it has been followed by a similar pattern for 42HFCS with pricing at 90 percent of 55HFCS. However, the ability of the price leaders to extract higher prices deteriorated somewhat compared with the original 1985/86 introduction. Soft demand for soft drinks in summer 1987 caused some discounting to announced prices. With weak seasonal demand in winter the prices for 1987 were about 9 percent lower than in 1986. This weakening might have continued except that the 1988 drought caused higher corn prices and a sharp rise corn costs which limited discounting again.

One problem with establishing a pattern of price leadership in the HFCS industry is that not every plant has the ability to switch production capacity to alternative products such as starch or alcohol in periods of low seasonal demand. Smaller firms feel a necessity to discount as necessary to assure continued sales in these periods. Larger firms are reluctant to absorb all the cutback in sales in low demand periods. They bear the potential risk that summer peak demand could be lower than expected because of cool summer weather.

### Performance of the U.S. Sweetener Industry

Where possible performance of sweetener industry segments will be examined by observing the price-cost-margin (PCM). The PCM is calculated according to the formula  $PCM = (P - C)/P$ , where P is price and C is unit cost. Ideally the cost should be marginal cost, but this is not generally available. Average variable costs are used as a substitute for marginal costs, since they should be relative close to marginal costs for marginal sales. A PCM persistently above zero indicates performance not representative of perfect competition.

#### Cane Sugar Refiners

No PCM was could be calculated for cane refiners because of a lack of good cost or price data. Cane sugar refiners tend to sell the marginal tonnage of sugar at or near costs of production under tolling arrangements. To this extent the performance of the cane sugar refining industry would be expected to approximate that under perfect competition. This is important because if cane sugar refiners could exercise market power in a large way, the ability of USDA to achieve price support through quotas would be compromised. Obviously quotas that limit imports could not be effective in achieving a price objective if competition failed to force the industry to maximize output within the quota limit and price accordingly.

#### Beet Sugar Processors

Beet sugar processors price their sugar at a discount to sugar. USDA reports wholesale refined beet sugar prices and ERS has estimated U.S. beet sugar costs of production. The U.S. wholesale refined beet sugar price is used for the price although quoted prices are almost always above the market. Sellers do not quote their actual lowest selling prices because all their customers would want that price. However, this is the best price series available for this purpose although the PCM may be slightly overstated.

Table 6 shows the PCM for the U.S. beet sugar processing industry for the years 1981-88 for which USDA has estimated beet sugar production costs. The beet sugar PCM ranges from a high of 35.67 percent in 1987 to a low of 20.30 percent in 1988. In general there is a declining trend in the PCM except for the high point in 1987. The beet sugar PCM is persistently above zero which indicates that less than perfectly competitive performance is probable.

#### Cane Sugar Milling

USDA has estimated costs of production for Florida, Hawaii, Texas and Louisiana sugar cane industries. Florida and Hawaii costs were estimated by USDA based upon accounting data. The application of accounting tends to make all costs come

out equal to prices which makes calculation of a PCM difficult. The Louisiana cost of production is used to examine the PCM for Louisiana sugarcane millers.

Table 7 also shows the PCM for Louisiana cane sugar millers. The PCM ranges from a low of 0.95 percent to a high of 31.78 percent over the period 1981-88. The low price cost margins in a couple of years tends to indicate that the Louisiana cane sugar millers PCM may not be persistently well above zero. Competition may somewhat limit their ability to obtain profits from market structure. This is consistent with the large number of cane mills of relatively small size in Louisiana which sell there product to a limited number (3) of local refineries.

### Corn Sweeteners

Estimation of costs of corn sweetener production is a general industry practice. Net corn cost can be obtained by subtracting byproduct credits from corn prices. Then the costs of HFCS can be estimated by adding other average variable costs of production based on engineering studies to net corn costs. HFCS costs of production can be approximated as shown in table 8.

Using wholesale list prices for 42HFCS and 55HFCS, the price-cost-margins for HFCS were estimated as shown in table 8. The PCM for 55HFCS has varied from a low of 41 percent when the product was introduced to a high of 63 percent during the period of high sugar prices in 1981. Since the HFCS market matured in 1985, the PCM has held between 49-60 percent. The PCM for 42HFCS has been more variable ranging from a high of 68 percent during the record high sugar prices of 1974-75 to a low of 36 percent in 1979 when 55HFCS became competitive with 42HFCS in many uses.

These high price-cost-margins suggest that the corn sweetener industry exhibits less than a competitive performance. These PCM are not only persistently above zero, but substantially so. Even a competitive industry could be expected to take advantage of the price umbrella of the sugar price support program. Such an industry could only be competed back to pricing on a cost basis by entry of additional firms, given that there is an upward limit on potential quantities marketed in liquid applications. No obvious barriers to entry exist for HFCS production except for possible barriers due to economies of scale.

### RESULTS AND CONCLUSIONS

The analysis of structure, conduct, and performance for the U.S. sweetener industry suggests some grounds for concern that less than perfect competition prevails. Corn sweetener producers certainly have not had prices competed down to costs. Beet sugar processors may be receiving a return above cost consistently and possibly the same is true for cane sugar millers in some years. However, all this is complicated by the existence of the U.S. price support program for sugar which deliberately restricts imports to support U.S. prices and domestic producers of sugarcane and sugar beets. The program could not work if beet processors and cane millers were not profitable in most years.

Assuming trade liberalization might eliminate the U.S. sugar program, structural issues should be considered in assessing the impact. For example, the corn sweetener industry would have little reason to cut back on output unless U.S. sugar prices fell below the cost of production. Hence, prices could fall with



only minor changes in domestic HFCS output. The impact on beet sugar processors will depend on costs of production as well. Perhaps the price of sugar beets could be lowered a little without losing growers at many plants, but as U.S. sugar prices fall, some beet sugar processors will probably find they are producing at a loss. Cane millers will be in similar circumstances, although it is less certain how quickly sugarcane growing would be abandoned. Because it is a perennial crop, acreage reductions are slow, and most reductions of cane acreage are the result of mill closing rather than growers deciding to cut back. Cane sugar refiners are the least affected by price declines, since they buy their input cheaper and price to cover their refining costs.

An interesting aspect of multinational structure has been the purchase of U.S. northeast cane refiners by Canadian sugar refiners. Is this protection against the most likely source of competition in the case of trade liberalization?

Based on efficiency, a large portion of the U.S. industry could be expected to survive, since U.S. costs of production for beet sugar are not that different from those of other leading world producers. Cane production in Florida and Hawaii is believed to be very efficient relative to foreign producers. The U.S. corn sweetener industry is believed capable of producing HFCS at costs below those of the most efficient world sugar producers (assuming current corn prices). However, costs of production are not a limiting factor on world sugar prices. World prices have often fallen below the costs of all sugar producers and have persisted at low levels over long periods. Since even an efficient industry can be injured by world sugar cycles, most countries have chosen to protect domestic sugar producers in some manner. Finally, comparative advantage might result in developing countries supplying sugar even at costs that are higher than those in developed countries because of the likelihood that they have a comparative advantage in sugar production relative to other goods.



Table 1.--U.S. Sugarcane Milling Company Capacity, By Region and Firm, 1980-88.

Region	Company	1980	1981	1982	1983	1984	1985	1986	1987	1988
Grinding Capacity in 1,000 Short Tons per Day										
Hawaii 1/	Alexander & Baldwin, Inc.:									
	Hawaiian Commercial & Suga	11	11	11	11	11	11	11	13	13
	McBryde Sugar Co., Ltd.	3	3	3	3	3	3	3	3	3
	Amfac, Inc.:									
	Kekaha Sugar Co., Ltd.	3	3	3	3	3	3	3	3	3
	The Lihue Plantation Co. L	4	4	5	5	5	5	5	5	5
	Oahu Sugar Co., Ltd.	3	5	5	5	5	5	5	6	6
	Pioneer Mill Co., Ltd.	3	3	3	3	3	3	3	3	3
	Puna Sugar Co., Ltd.	5	4	4	4	4	0	0	0	0
	C. Brewer and Co., Ltd.:									
	Hilo Coast Processing Co.	8	5	5	5	5	5	5	5	5
	Ka'u Sugar Co., Inc.	3	3	3	3	3	3	3	3	3
	Olokele Sugar Co., Ltd.	3	3	3	3	3	3	3	3	3
	Castle and Cooke, Inc.:									
	Waialua Sugar Co.	5	5	5	5	5	5	5	5	5
	Theo. H. Davies & Co., Ltd.:									
	Honakaa Sugar Co.	4	4	4	4	0	0	0	0	0
	Laupahoehoe Sugar Co.	4	4	4	4	0	0	0	0	0
	Hamakua Sugar Co., Inc.									
	Haina	0	0	0	0	5	5	5	5	5
	Ookala	0	0	0	0	5	5	5	0	0
	TOTAL	56	56	57	57	58	54	54	53	53
Louisiana	Alma Plantation, Ltd.	2	2	2	2	2	2	2	4	4
	Breaux Bridge Sugar Coop., Inc	2	2	2	2	2	2	2	2	3
	Caire & Graugnard	2	2	2	2	2	2	2	2	2
	Cajun Sugar Coop, Inc.	6	6	6	6	6	6	6	6	6
	Caldwell Sugars Coop. Inc.	5	5	5	5	5	5	5	5	6
	Cora-Texas Mfg. Co., Inc.	4	4	4	4	4	4	4	7	7
	Dugas & LeBlanc, Ltd.	4	4	4	4	4	4	4	4	5
	Evan Hall Sugar Coop, Inc.	5	5	5	5	5	5	5	5	5
	Glenwood Coop., Inc.	4	4	4	4	4	4	4	4	4
	Helvetia Sugar Coop, Inc.	3	3	3	0	0	0	0	0	0
	Iberia Sugar Coop, Inc.	4	4	4	4	4	4	4	6	6
	Jeanerette Sugar Co., Inc.	3	3	3	3	3	3	3	3	5
	LaFourche Sugar Corp.	7	7	7	7	7	7	7	9	9
	Harry L. Laws & Co., Inc.	4	4	4	4	4	4	4	4	4
	Meeker Sugar Coop, Inc.	4	0	0	0	0	0	0	0	0
	Oaklawn Sugar Co.	4	4	4	4	4	4	4	4	0
	M.A. Patout & Sons, Ltd.	5	5	5	5	5	9	9	9	9
	St. James Sugar Coop, Inc.	5	5	5	5	5	5	5	6	6
	St. Martin Sugar Coop, Inc.	4	4	4	4	4	4	4	4	4
	St. Mary Sugar Coop, Inc.	4	4	4	4	4	4	4	5	5
	Savoie Industries, Inc.	4	4	4	4	4	4	4	4	6
	Smithfield, Milliken & Farwell	4	0	0	0	0	0	0	0	0
	South Coast Sugars, Inc.	5	5	5	5	5	5	8	8	8
	Sterling Sugars, Inc.	8	8	8	8	8	8	8	8	8
	Supreme, J. Aron & Co. Inc.	4	0	0	0	0	0	0	0	0
	Teche Sugar Company	0	0	0	0	0	0	0	0	5
	TOTAL	103	92	92	89	89	93	96	107	114

Table 1.--U.S. Sugarcane Milling Company Capacity, By Region and Firm, 1980-88.--Continued

Region	Company	1980	1981	1982	1983	1984	1985	1986	1987	1988
Grinding Capacity in 1,000 Short Tons per Day										
Florida	Atlantic Sugar Association	8	8	8	10	10	10	10	12	12
	Gulf & Western Food Products	18	18	18	18	18	0	0	0	0
	Okeelanta Sugar Corp.	0	0	0	0	0	18	18	20	20
	Osceola Farms Co.	8	8	10	10	10	10	10	10	10
	Sugarcane Growers Coop of Flor	18	19	19	19	19	21	21	21	21
	United States Sugar Corp.:	25	29	32	32	32	32	32	36	36
	Talisman Sugar Corp.	8	8	10	10	10	10	10	10	10
	TOTAL	84	89	97	99	99	101	101	109	109
Texas	Rio Grande Valley Sugar Coop	9	9	9	9	9	9	10	10	10
Puerto Rico	Aguirre	8	6	6	6	6	6	6	6	6
	Cambalache	4	4	4	4	4	4	4	0	0
	Coloso	6	6	6	6	6	6	6	6	6
	Guanica	8	8	8	8	8	8	0	0	0
	Mercedita	5	5	5	5	5	5	5	5	5
	Plata	5	5	5	5	5	6	6	6	6
	Roig	5	5	5	5	5	5	4	4	4
	TOTAL	40	38	38	26	26	26	26	26	26
U.S.	GRAND TOTAL	291	283	291	278	280	283	287	304	311

1/ Hawaii mills operate all year while other regions' mills operate seasonally.

Source: U.S. Department of Agriculture and Trade Sources.

Table 2.--U.S. Beet Sugar Company Beet Slicing Capacity, by Firm, 1979-89

Company	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
	Short Tons per Day										
Holly Imperial 1/	28000	28000	28000	28000	28000	28000	28000	28000	28000	34500	34500
Amalgamated	26525	26525	26525	26525	26525	26525	26525	26525	26525	26525	26525
American Crystal	28800	28800	29200	29200	29200	29200	26200	26200	26200	26200	26200
Western 2/	0	0	0	0	0	0	0	20600	20600	20600	20600
North Central	11000	11000	11000	11000	11000	11000	11000	11000	11000	11000	11000
Michigan 3/	8950	8950	8950	8950	8950	8950	8950	8950	8950	8950	8950
Spreckels 4/	22200	22200	22200	22200	16200	12000	12000	12000	12000	12000	7800
Monitor 5/	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Great Lakes	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200	3200
Delta 6/	0	0	0	0	0	0	3000	3000	3000	3000	3000
Union 7/	6000	6000	6000	6500	6500	6500	6500	6500	6500	0	0
Great Western	35550	33350	33350	33350	33350	33350	33350	0	0	0	0
Utah-Idaho	24600	0	0	0	0	0	0	0	0	0	0
Total	198825	172025	172425	172925	166925	162725	162725	149975	149975	149975	145775

1/ Holly Sugar Company merged with cane refiner, Imperial Sugar Company in 1988.

2/ Western Sugar formed by Tate & Lyle from assets of bankrupt Great Western Sugar beginning in 1985.

3/ Michigan Sugar Company acquired by cane refiner, Savannah, in 1986.

4/ Spreckels Sugar Company divested by Amstar in 1986.

5/ Monitor Sugar Company acquire by South African sugar refiner, A.G. Smith in 1984.

6/ Delta Sugar Company divested by American Crystal Sugar Company in 1985.

7/ Union Sugar Company acquired by Holly Sugar Company in 1987.

Source: U.S. Department of Agriculture, Economic Research Service.

Table 3.--U.S. Cane Sugar Refinery Melting Capacity, by Company, 1980-1990.

Company	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
	Short Tons per Day										
Tate & Lyle 1/	0	0	0	0	0	0	0	0	0	0	7950
Savannah 2/	2350	2350	2550	2550	2900	2900	3400	5800	5800	5800	5800
California & Hawaii	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700	3700
Lantic Sugar	0	0	0	0	0	0	0	0	0	0	1800
Imperial Holly 3/	1500	1500	1500	1500	1650	1650	1650	1650	1650	1650	1650
Supreme Sugar 4/	700	700	700	700	700	700	700	700	700	700	700
Louisiana Sugar Cane	600	600	600	600	600	600	600	600	600	600	600
Okeelanta Sugar	0	0	0	0	0	500	500	500	500	500	500
Amstar Corporation 5	10550	10550	10550	8950	8950	8950	8950	8950	7950	7950	0
Refined Sugars 6/	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	0
Colonial Sugars 7/	1500	1500	1500	1500	1800	1800	1800	0	0	0	0
Florida Sugar Refine	390	390	390	390	390	390	0	0	0	0	0
Gulf & Western 8/	500	500	500	500	500	0	0	0	0	0	0
Godchaux-Henderson	1700	1700	1700	1700	1900	0	0	0	0	0	0
Revere Sugar	2670	2670	2970	2970	1120	0	0	0	0	0	0
Industrial Sugars 9	300	300	300	300	0	0	0	0	0	0	0
U.S. TOTAL	28260	28260	28760	27160	26010	22990	23100	23700	22700	22700	22700

1/ Tate & Lyle acquired corn refiner, A.E. Staley, in 1989 and beet processor, Western Sugar in 1985.

2/ Savannah Foods and Industries acquired beet processor, Michigan Sugar Company, in 1986.

3/ Imperial Sugar Company merged with Holly Sugar Company in 1988.

4/ Supreme Sugar Company is a subsidiary of Archer, Daniels, Midland, Inc.

5/ Amstar acquired by British refiner, Tate & Lyle, and its Canadian subsidiary, Redpath, in 1989.

6/ Refined Sugar sold to Lantic Sugar, a Canadian refiner, by Tate & Lyle upon acquisition of Amstar.

7/ Colonial Sugars acquired by Savannah Foods and Industries in 1986.

8/ Gulf & Western Food Products divested Okeelanta Sugar Company in 1984.

9/ Industrial Sugars, Inc. acquired by Colonial Sugars in 1983.

Source: U.S. Department of Agriculture and Trade Sources.

Table 4.--U.S. Refined Sugar Sellers Market Share and Concentration Ratios, 1983-90.

Firm	1983	1984	1985	1986	1987	1988	1989	1990
Tate & Lyle	7.82	7.56	7.73	7.86	9.69	8.98	9.57	23.73
Savannah	6.48	7.76	10.50	11.41	15.88	15.75	17.00	16.33
Holly Imperial	0.00	0.00	0.00	0.00	0.00	12.95	12.88	12.66
American Crystal	7.31	7.04	7.80	8.78	10.36	11.42	9.54	10.81
C&H	9.41	9.90	10.17	9.66	8.77	8.40	9.22	8.86
Amalgamated	5.72	6.66	6.85	7.02	8.58	8.81	8.53	8.34
North Central	3.05	2.83	2.88	3.93	3.51	4.63	2.78	4.39
Lantic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.31
Spreckels	0.00	0.00	0.00	0.00	3.86	4.14	3.61	3.89
Supreme	1.78	1.87	1.92	1.83	1.66	1.59	1.74	1.68
Louisiana	1.53	1.61	1.65	1.57	1.42	1.36	1.50	1.44
Monitor	0.70	0.69	0.89	1.14	1.06	1.37	1.27	1.30
Okeelanta	0.00	0.00	1.37	1.31	1.19	1.14	1.25	1.20
Delta	0.32	0.52	0.68	0.70	0.45	0.58	0.50	0.56
Great Lakes	0.00	0.00	0.00	0.48	0.65	0.58	0.54	0.53
Amstar	26.25	26.95	28.43	26.81	21.22	18.30	20.07	0.00
Holly	4.45	4.48	6.13	7.09	7.79	0.00	0.00	0.00
Imperial	3.81	4.41	4.53	4.31	3.91	0.00	0.00	0.00
Union	1.14	1.14	1.36	1.40	0.00	0.00	0.00	0.00
Colonial Sugars	3.81	4.82	4.95	4.70	0.00	0.00	0.00	0.00
Great Western	1.53	1.31	1.10	0.00	0.00	0.00	0.00	0.00
Florida Sugar Refinery	0.99	1.04	1.07	0.00	0.00	0.00	0.00	0.00
Gulf & Western	1.27	1.34	0.00	0.00	0.00	0.00	0.00	0.00
Godchaux-Henderson	4.32	5.08	0.00	0.00	0.00	0.00	0.00	0.00
Revere Sugar	7.55	3.00	0.00	0.00	0.00	0.00	0.00	0.00
Industrial Sugars	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U.S. Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
CR4	50.78	52.16	56.82	56.66	57.15	58.41	59.52	63.53
Herfindahl Index	1114	1154	1294	1248	1165	1157	1228	1316

Source: U.S. Department of Agriculture and Trade Sources.



Table 5.--Shares of U.S. and Canadian HFCS Production Capacity of Firms  
Controlling HFCS Marketing, 1974-88.

Firm	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
ADM	0	3	24	21	28	26	25	26	31	36	35	34	33	34	35
Staley 1/	50	46	32	33	25	25	25	25	28	26	27	23	24	26	27
CPC 2/	0	0	12	8	6	6	8	9	9	14	15	14	14	13	13
Cargill	0	0	0	4	6	5	5	10	13	11	9	14	14	12	12
American															
Maize 3/	0	0	0	4	4	4	5	3	5	4	7	9	9	9	8
Hubinger 4/	0	0	0	0	6	8	7	6	5	5	6	6	6	6	5
Amstar 5/	0	10	5	7	5	5	5	4	4	4	2	0	0	0	0
RJR															
Nabisco 6/	50	41	28	24	19	18	17	12	6	0	0	0	0	0	0
Holly	0	0	0	0	0	2	2	1	0	0	0	0	0	0	0
Anheuser															
Busch 7/	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Great															
Western 8/	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
CR4	100	100	95	86	79	78	75	74	80	87	85	85	85	85	87
HHI	5000	3906	2553	2251	1919	1795	1732	1690	2097	2346	2349	2194	2174	2262	2356

1/ Staley Continental acquired by Tate & Lyle, the British sugar refiner, in 1988.

2/ Includes Canadian plants whose output is marketed by CPC, mostly in the United States.

3/ American Maize Decatur, AL plant joint venture with Amalgamated Sugar before June 1983.

4/ Hubinger acquired by H.J. Heinz in 1984.

5/ Amstar's Dimmitt, TX plant sold to American Maize in 1984.

6/ RJR Nabisco plants leased to ADM in June 1982.

7/ Anheuser Busch plant sold to Staley and HFCS production discontinued in March 1982.

8/ Great Western plant closed in 1981, sold to Coors in 1983 but managed by Hubinger.

Source: Connell Commodities Corn Sweetener Reports and Trade Sources.

Table 6.--Price-Cost-Margins for the U.S. Beet Sugar Processing Industry, 1981-88.

	1981	1982	1983	1984	1985	1986	1987	1988
	cents per pound, refined sugar, bulk basis							
Sugar Beet Production Cost:								
Total	11.47	12.35	12.96	12.19	11.55	11.08	10.44	15.82
Beet Processing Cost:								
Variable Cost	10.65	11.13	9.49	9.40	9.02	8.41	7.61	8.21
Total Processing Variable Cost	22.12	23.48	22.45	21.59	20.57	19.49	18.05	24.03
Credits:								
Total	2.81	3.21	3.73	3.52	3.23	3.01	2.87	3.72
Net Average Variable Cost	19.31	20.27	18.72	18.07	17.34	16.48	15.18	20.31
U.S. Wholesale Beet Sugar Price	28.26	27.62	26.10	25.66	23.18	23.42	23.60	25.48
Price-Cost-Margin (Percent)	31.67	26.60	28.27	29.57	25.19	29.64	35.69	20.30

Source: U.S. Department of Agriculture, Economic Research Service.

Table 7.--Louisiana Sugarcane and Cane Sugar Price-Cost-Margins, 1981-88.

	1981	1982	1983	1984	1985	1986	1987	1988
	Cents per Pound							
Sugarcane Production Costs:								
Total Costs	10.20	11.11	11.96	14.63	11.86	10.44	10.49	10.23
Sugarcane Processing Costs:								
Variable Cash Expenses	6.25	6.45	6.57	7.28	6.92	6.38	5.28	5.54
Other Costs	12.60	13.57	14.47	17.97	14.67	13.01	12.40	12.40
Total Costs	18.85	20.02	21.04	25.25	21.59	19.39	17.68	17.23
Credits:								
Total	0.79	0.67	1.06	0.76	0.95	0.91	0.77	0.89
Net total costs	18.06	19.35	19.98	24.49	20.64	18.48	16.92	16.34
Net Average Variable Costs	15.66	16.90	17.47	21.15	17.84	15.91	15.01	14.88
U.S. raw sugar price	16.34	20.69	21.75	21.35	19.15	21.12	21.73	21.81
Price Cost Margin (Percent)	4.16	18.32	19.69	0.95	6.85	24.66	30.94	31.78

Source: U.S. Department of Agriculture, Economic Research Service.

Table 8.--Calculation of Price Cost Margins for 42HFCS and 55HFCS Based on Net Corn Costs, 1974-88.

Year	Net Corn Cost \$/Bu.	55HFCS Cost \$/Bu.	55HFCS Cost Dry \$/Cwt.	55HFCS Price Dry \$/Cwt.	55HFCS PCM %	42HFCS Cost \$/Bu.	42HFCS Cost Dry \$/Cwt.	42HFCS Price Dry \$/Cwt.	42HFCS PCM %
1974	1.72	0.00	0.00	0.00	0.00	3.52	10.56	22.00	52.00
1975	1.59	0.00	0.00	0.00	0.00	3.39	10.17	22.67	55.14
1976	1.37	0.00	0.00	0.00	0.00	3.17	9.51	14.03	32.22
1977	0.85	2.85	8.55	14.50	41.03	2.65	7.95	12.12	34.41
1978	0.92	2.92	8.76	15.50	43.48	2.72	8.16	13.15	37.95
1979	1.24	3.24	9.72	15.66	37.93	3.04	9.12	13.26	31.22
1980	1.52	3.52	10.56	28.47	62.91	3.32	9.96	21.47	53.61
1981	1.77	3.77	11.31	23.59	52.06	3.57	10.71	21.47	50.12
1982	1.12	3.12	9.36	18.81	50.24	2.92	8.76	14.30	38.74
1983	1.65	3.65	10.95	21.60	49.31	3.45	10.35	18.64	44.47
1984	1.76	3.76	11.28	22.70	50.31	3.56	10.68	19.94	46.44
1985	1.39	3.39	10.17	20.03	49.23	3.19	9.57	17.75	46.08
1986	0.82	2.82	8.46	19.96	57.62	2.62	7.86	18.07	56.50
1987	0.35	2.35	7.05	17.46	59.62	2.15	6.45	16.50	60.91
1988	0.86	2.86	8.58	18.73	54.19	2.66	7.98	16.51	51.67

Source: U.S. Department of Agriculture.

# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91 Session #C-18

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## **LOW CALORIE SWEETENERS OUTLOOK**

Robert C. Gelardi  
Executive Director, Calorie Control Council

Good Afternoon.

It's a pleasure to be here to discuss the future outlook for low-calorie sweeteners.

For those not familiar with the Calorie Control Council, it was formed nearly 25 years ago. Our 60-plus members are international manufacturers of low-calorie, lite and diet foods and beverages, as well as the available, and soon-to-be-available, low-calorie sweeteners.

The low-calorie sweeteners currently awaiting FDA approval are the intense sweeteners alitame, cyclamate and sucralose. Additionally, petitions for expanded uses for aspartame and acesulfame-K are pending.

Before I discuss the individual low-calorie sweeteners and their future prospects, however, I believe it will be helpful to give you an overview of key consumer trends affecting the demand for these sweeteners.

### **DIETING TRENDS**

Most Americans love good food, and particularly sweets. This love affair has resulted in, among other things, 34 million obese Americans, according to the Surgeon General. And there are millions more who, though not obese, are considered overweight. The dilemma is how to satisfy our craving for sweet — and, yes for fatty foods also — and, at the same time, watch our calories.

A national consumer survey conducted by the Council in April 1989 revealed that roughly 48 million adult Americans consider themselves on a diet. That includes one out of every three women and one out of five men. The vast majority (85%) are dieting to either lose or maintain their weight.

How are they dieting? The number one method is cutting down on foods high in sugar or fat. Exercise ranked as the second most used method. This was

followed by consumption of low-fat, and then low-calorie, sugar-free, foods and beverages.

### LOW-CAL PRODUCT POPULARITY

Our research also shows an increasing number of people using low-calorie food and beverages — 93 million adult Americans — and most of these, almost 60%, are not on a diet. The number of low-calorie product consumers has jumped 15 million since 1986 and more than doubled in the past decade.

Clearly, low-calorie foods and beverages are no longer just for dieters. They're being incorporated as part of an overall healthy lifestyle. In fact, the most-mentioned reason for using low-calorie foods and beverages was to stay in better health.

The 93 million adult consumers of low-calorie products constitute a majority of adults in this country. For women, 53 million consume these products. Men also are being attracted to the low-calorie fold in increasing numbers. Today more than 40 million of men are consuming low-calorie products.

We've seen a dramatic growth in popularity of these products over the last decade, and the trend is continuing. Among low-calorie food and beverage consumers, more than half would like to have even more low-calorie products to choose from. How will this demand be met?

### MULTIPLE SWEETENER APPROACH

The development and approval of a variety of low-calorie sweeteners will play a key role in meeting consumer demand. Having a variety of low-calorie sweeteners to choose from allows manufacturers to use the ingredient, or combination of ingredients, best suited for a given product — what we call "the multiple sweeteners approach."

For nearly a century, low-calorie products were almost entirely dependent on saccharin, the oldest of the low-calorie sweeteners. Now with the addition of aspartame and acesulfame-K, and possible future approval of sweeteners like cyclamate, alitame and sucralose, the multiple sweetener approach is providing new product and taste choices.

During the 60's, cyclamate and saccharin were blended together in a variety of popular diet soft drinks and other products. This was really the first practical application of the multiple sweetener approach. The primary advantage of the sweetener blend was that saccharin boosted the sweetening power of cyclamate, while cyclamate masked the aftertaste that some people associate with saccharin.



The two sweeteners when combined have a synergistic effect — that is the sweetness of the combination is greater than the sum of the individual parts. And this is true for most sweetener blends. As you know, cyclamate was taken off the U.S. market in 1970, leaving saccharin as the only available low-calorie alternative to sugar until aspartame was approved.

### Aspartame

It wasn't until 1981 that aspartame made its debut in the U.S. food supply. Since then, aspartame's approved uses have been expanded considerably. Currently, it is used in thousands of brand products worldwide. Aspartame — under the brand NutraSweet — has been the driving force behind the booming popularity of low-calorie products in the United States.

Petitions are pending for even more uses of aspartame, including the use of a heat-protected version of the sweetener which can withstand oven temperatures. Approval of this petition would allow for aspartame-sweetened, low-calorie baked goods — a product category which is in much demand by consumers.

### Acesulfame-K

In 1988 FDA approved a new low-calorie sweetener, acesulfame-K — brand name Sunette. The initial approved uses of acesulfame-K are in dried beverage mixes, instant coffee and tea, puddings, gelatins, chewing gum, dairy product analogs and as a table-top sweetener. In 1989 the first acesulfame-K product was introduced in the U.S. — a table-top sweetener called "Sweet One."

Acesulfame-K's stability in heat and in liquids makes it very versatile, with potential use in many products. Petitions for its use in soft drinks and baked goods have been filed in recent months.

### Low-Calorie Sweeteners — The Next Wave

Sucralose, cyclamate and alitame could be added to FDA's list of approved low-calorie sweeteners soon. Sucralose has reportedly passed FDA's inspection and may be approved next year for use in a number of products.

### Sucralose

Sucralose was discovered in 1977 when a Tate & Lyle chemist identified a halogenated sugar as a compound with very good commercial possibilities. By 1980, Tate & Lyle had reached an agreement with Johnson & Johnson to undertake a joint development program for sucralose. Johnson & Johnson established McNeil Specialty Products Company to carry out the cooperative

program with Tate & Lyle. Under the agreement, Tate & Lyle licensed McNeil to seek approval for and market sucralose in the U.S., Australia, New Zealand, Central and South America and the Middle East. Tate & Lyle retained its rights to sucralose in Europe, Canada, Africa and the Far East. Extensive research and development were undertaken over the next seven years.

Sucralose is made from common table sugar through a multi-step process. It has a clean, high-quality taste with an average sweetness intensity of about 600 times that of sugar. It is both non-caloric and non-cariogenic and resistant to hydrolysis and breakdown by microorganisms.

Sucralose's remarkable stability, its high water solubility and high-quality sweetness make it a very versatile sweetener for use in a wide range of products. The FDA has been petitioned for the use of sucralose in 14 categories including baked goods; beverages; chewing gum; dairy product analogs; salad dressings; frozen dairy desserts; fruit and water ices; gelatins and puddings; jellies and jams; milk products; sugar substitutes; coffee and tea; processed fruits and fruit juices; and sweet sauces, toppings and syrups.

In summary, the safety data base demonstrates that sucralose is safe for its intended use. Over 80 studies demonstrate that sucralose is without adverse effects at doses 400 times the projected maximal mean daily human intake. Studies in man have demonstrated no adverse effects.

### Cyclamate

Cyclamate is a sweetener very familiar to many of you. Discovered in 1937, cyclamate was approved as a food additive by the Food and Drug Administration in 1949. During the 1950s, food technologists discovered cyclamate's chemical inertness, excellent taste, stability and solubility.

During the past decade, cyclamate has undergone extensive additional testing, as well as intensive review by prestigious groups. The FDA's own Cancer Assessment Committee in 1984 found that cyclamate is not a carcinogen and stated "After evaluation of all chronic bioassays performed with laboratory animals on cyclamate or its primary metabolite, cyclohexylamine, the CAC has reached the judgment that there is very little credible data to implicate cyclamate as a carcinogen at any organ/tissue site to either sex of any animal species tested."

The National Academy of Sciences reconfirmed FDA's Cancer Assessment Committee's conclusion that cyclamate was not a carcinogen.

As part of our petition for cyclamate's reapproval, the Calorie Control Council and Abbott Laboratories have provided FDA with a number of additional studies and answered several questions at FDA's request. Though reapproval is not quite here, hopefully an FDA decision will bring consumers cyclamate-sweetened products in a year or two. Cyclamate is currently available in over 50 countries around the world and, when reapproved in the U.S., it will be most commonly used in combination with other sweeteners as its sweetening power is only 30 times that of sugar.

### Alitame

The other low-calorie sweetener pending FDA approval is alitame. Alitame is a dipeptide based high intensity sweetener formed from amino acids, L-aspartic and D-alanine, and a novel amine. Like aspartame it is chemically synthesized. The manufacturer, Pfizer, filed a food additive petition with FDA in August 1986. Alitame is not presently approved anywhere in the world, although petitions are currently pending in a number of countries.

Alitame has a clean, sweet taste with no unpleasant aftertaste and is stable at elevated temperatures and over a broad pH range. It is approximately 2,000 times sweeter than sucrose and is highly soluble in water. Alitame has been tested extensively in both animals and humans and found to be safe.

Alitame is sufficiently stable for use in hard and soft candies, heat pasteurized foods and in high temperature processed neutral pH foods such as sweet baked goods. It has exhibited excellent functionality in freshly prepared, refrigerated, frozen and dry food products.

The food additive petition for alitame requests broad clearance for alitame in foods for which standards of identity do not preclude such use. Categories petitioned include baked goods and baking mixes; presweetened, ready-to-eat cereals; milk products; frozen desserts and mixes; fruit and water ices; fruit drinks ades, and mixes; jellies and jams; sweet sauces; beverages; table-top sweeteners; confections and frostings; gelatins and puddings; dairy product analogs; coffee and tea; candy; and chewing gum. FDA's review of alitame is continuing.

### A DIETARY REVOLUTION

In closing, I would underscore that the dietary revolution which began less than three decades ago is far from over. As we said earlier, more than half of the 93 million low-calorie food and beverage consumers in this country say they want more low-calorie choices. Thus, as approved uses for existing low-calorie sweeteners are expanded, and new additional low-calorie sweeteners become available, product choices and the market will expand to meet this tremendous consumer demand.



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## CHANGING TECHNOLOGY: PESTICIDE USE AND THE ENVIRONMENT

Thomas J. Gilding  
Director of Environmental Affairs  
National Agricultural Chemicals Association

I would like to compliment USDA for organizing this important conference. The future of agriculture has been the focus of a good number of public policy forums over the past year, and certainly with many more to come in the next and following years. Conferences that are designed to promote informed policy assessment and decision-making should be welcomed as a process critical to maintaining a productive, efficient and environmentally sound U.S. agriculture.

In order for discussions on the future of agriculture to be meaningful and constructive, emotions, unfounded statements and narrow self-serving interests must be kept to a minimum by all parties involved. It is important that goals, on the basis of our society as a whole, be defined in search of, or assuring sustainability in agriculture. The issues surrounding sustainable agriculture are not the subject of my speech today. Therefore, I will not dwell on them other than to say that sustainability in agriculture is important and must be considered in any discussions or decisions concerning the future of agriculture.

Before leaving the subject of sustainable agriculture, I would like to call attention to a report prepared by the Council for Agricultural Science and Technology (CAST) titled Long-Term Viability of U.S. Agriculture (Report No. 114, June 1988). To me, this report provides a realistic perspective of the issues and goals for sustainable agriculture. It defines "long-term viability" of agriculture (sustainability) as having three distinct dimensions; 1) economic viability, 2) environmental and natural resources viability, and 3) social viability.

Indeed, economics, environmental protection, wise use of natural resources and social values are all important goals for agriculture. I am one that believes that these different dimensions can be brought into agriculture in a way that maximizes achievement of their respective goals. However, we cannot be so naive as to think that during the process of



developing and implementing policy, conflicts will not exist and trade-offs will not have to be made. The answer lies, without a doubt, in a process of balancing these complementing, competing and conflicting goals. We cannot lose sight that agriculture has been and will continue to be a significant factor in our quality of life, i.e. food security, economic well-being (both in GNP and as an asset in international trade) and a number of social values.

Technology "change" is the underlying theme of this conference. There is, however, another form of "change" that has fast become an important factor in policy debates on agriculture. This other "change", as we all know, is the environmental dimension of sustainable agriculture. The emergence of environmental issues is the result of our society's overall awareness of the need to become better stewards of our environment. With respect to agriculture this "awakening" has meant increasing interest and involvement by the non-agricultural elements of society in the way agriculture does business. The final results of this will ultimately mean societal standards for agriculture on environmental performance, measured and controlled by public expectations and demands for accountability.

As environmental performance becomes a form of society's "seal of approval" for agriculture, a relevant question, particularly in context of the theme of this conference, is what the role of technology is in achieving environmental goals for agriculture. The very same question can obviously be asked concerning achieving economic and social goals. To me, technology is really the means for achieving goals, supporting the required decision-making and bringing into existence the necessary strategies and equipment. This all points to the need for continuing evaluation and assessment of agricultural research policy and programs to assure that technology is responsive to the needs of those developing and implementing agricultural policy.

When discussing the technology changes in pest control strategies, one must do so from the perspective of time as being either "near-term" or "long-term". I will not attempt to quantify these two periods in exact years, other than to say that for "near-term", I would place those technology advances which can reasonably be projected within the realm of agricultural production as we know it today. The "long-term" perspective can only cause us to recognize that our ability to forecast technology change somewhere in the future is extremely limited, if not non-existent. In other words when we forecast future technology changes, we are really limited in perspective simply because we are looking into the future through today's "technology glasses."

I relate this perspective on the "long-term" to a speaker I heard several years ago at a Freshwater Foundation conference on agricultural chemicals and ground water. The speaker in talking about how fast our world is changing, illustrated her point by referring to a story about President Roosevelt assembling some of America's brightest scientists back in 1938 to help forecast future technology and technical challenges. This group of scientists, which has to be viewed as "our best shot" at predicting future technology, failed to predict atomic energy, jet aircraft, rockets, computers, etc., technologies that were not even a decade away. Future technology for agriculture may hold similar surprises, i.e. different ways for producing food and completely different societal goals that are unknown to us today.

Now back from the future. It is commonly recognized that normal evolution of technology and practices over the last 40 years has brought us to our current enviable level of agricultural efficiency and productivity. Agricultural pesticides have played an important part in this accomplishment and will continue to be a positive factor in the economic dimension of a sustainable agriculture. Farmers, based on their experience, use pesticides as a cost effectiveness means in helping to maximize efficiency and productivity in crop yields, and protecting these yields once achieved from risks of loss to insects or disease.

Certainly, future "near-term" technology advances will continue to make important progress in pest control strategies, both in minimizing or eliminating pest risks in the first place, and improving pest control strategies for when such measures are necessary. The elimination of pest threats is the ideal situation for farmers and should be one of the major goals for technology. However, we do live in a world where things unplanned and unwanted do happen, and the threats from pests to our food and fiber production, unfortunately, will be around for some time in the foreseeable future.

As we strive to further improve our abilities to control pests, it is important that we adhere to certain criteria for guiding technology's assistance. This criteria could also be used by farmers in the selection of pest control strategies (chemical or non-chemical). From the standpoint of sustainable agriculture, pest control strategies should attempt to maximize cost effectiveness, while minimizing environmental risks. Since agriculture is so diverse, applying this criteria will have to require different balancing levels, trade-offs, between these criteria according to agricultural locations, cropping systems and practices.

It is this maximizing cost effectiveness and minimizing environmental risks in agricultural pesticide use that is industry's goal for technology. Although improving cost

effectiveness will continue to be an important factor as new products are developed and registered. I think it is reasonable to say that environmental risks have taken on new dimensions over the past 5-6 years, both for EPA, USDA, pesticide registrants and the public. Much attention and resources are now being directed towards understanding the potential for environmental risks and how they can be managed. This is the area where technology can make very important contributions to pest control strategies.

Probably the most noticeable impact that environmental considerations have had on pesticide registrants' research, development and registration process, is to address the environmental performance properties of candidate chemicals early in the selection process, rather than waiting until the more traditional decision-points of efficacy and human health have been made. Keep in mind, that the registration process is not only costly, but very time consuming. To make errors in the selection of chemicals to apply to EPA for registration is not only an unwise business practice, but potentially devastating to a company's economic viability. A common reference for measuring costs and time involved of the pesticide registration process is that for every chemical that receives commercial registration from EPA, as many as 10,000 chemicals may have been screened over a period of 8-10 years at a cost of 30-40 million dollars.

In order to maximize cost effectiveness and minimize environmental risks, pesticides have to be addressed on a product and site specific basis. To do otherwise, would only mean sacrificing the quality of effective risk management strategies and the possible removal of a pesticides as viable economic tool for agricultural producers in locations where in reality such actions are not warranted. The process involved is no more than implementing effective risk assessment and risk management of operations dealing with chemical storage, handling and application.

The major environmental issue facing pesticides is water quality both ground and surface water. Results from local and national monitoring studies are showing that the presence of pesticide residues in water resources is not a wide spread occurrence, either in numbers of pesticides and their frequencies and levels of detection. What is being shown, however, is that there are "problem areas", e.g 1) localized geographic areas where ground and surface waters are vulnerable, and 2) improper practices (human factors) that result in spills during storage and mixing/loading of pesticides, or disposal of pesticide wastes. The key to effective protection of water quality from pesticides is to recognize where these "problem areas" exist, and manage them accordingly.



Factors which contribute to the potential for a pesticide to get into water resources as a result of registered use can be grouped in the following three distinct, but dependent categories. They are: 1) Properties of the pesticide; 2) Conditions at the application site; and 3) Methods and timing of application. Within these categories, there are specific properties or conditions, each having some level of impact on the "potential" for a pesticide to get (or not to get) into ground or surface waters. In assessing potential risks for a given pesticide at a given application site, these categories need to be considered in combination and prioritized. The important factors within each category are:

Pesticide Properties "Pesticides" are chemicals which have a wide range in potential to move into water resources. The two most important properties of a pesticide chemical affecting its potential to get into ground or surface water, all other things being equal, are the rate of degradation (persistence) and ability to adsorb to the organic content in the soil or to soil particles.

Site Conditions Vulnerability of ground or surface water at the application site is primarily determined by the soil present, distance to ground or surface water, and climatic factors (amount and intensity of rainfall or irrigation). The soil characteristics of most importance are the texture, clay content, organic content and water holding capacity.

Methods and Timing of Application How a pesticide is applied (from both placement and loads) and when (relative to rain events or irrigation) can have significant affects on its potential to eventually get into ground or surface water.

Providing pesticide users with the proper information to assure the safe and beneficial use of pesticides is the overall thrust of registrants' ever increasing emphasis on product stewardship programs. Although currently being driven in response to environmental issues, these programs must also articulate the principles of prudent and judicious use of pesticides. This being to use pesticides only when needed, in amounts necessary to do what is intended, and in a manner that does not present unacceptable risk to health or the environment. The first two principles relate to maximizing cost effectiveness of pesticides, while the third principle addresses minimizing risk potentials, i.e. managing the risks.

In order to successfully achieve these stewardship goals, the agricultural chemicals industry must be actively involved in the on-going sustainable agriculture debate. In addition to being an active player, we must also become better informed on the



complexities of the issues surrounding sustainable agriculture so that we can: 1) promote realistic perspective on the contributions of agricultural pesticides in sustainable agriculture; 2) foster and defend responsible use of agricultural pesticides; and 3) accept close public scrutiny and strict government requirements on pesticides, but demand the same ground rules for all forms of pest control strategies.

The agricultural chemicals industry is committed to its role and responsibilities in the sustainability of agriculture. We recognize that the varied goals involved are complex, yet achievable through informed decision-making by society, with commitment and responsible action on the part of all.

A statement in a video program, "Ground Water and Agricultural Chemicals: Understanding the Issues", produced by the American Soybean Association and the National Corn Growers Association, although specifically addressing ground water, summarizes to the point what needs to be done in recognizing a sustainable, environmentally sound agriculture. The statement is "In balancing the parallel needs for protecting ground water and preserving agricultural productivity, it is important that the agricultural community recognizes that this is simply not a productivity issue. The millions of people that are served by the bounty of America's farms must recognize that it is simply not an environmental issue. The best interests of all parties are served when ground water is aggressively protected and agricultural productivity is maintained."



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FERTILIZER AND PESTICIDE USE AND THE ENVIRONMENT

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First, I appreciate being asked to address this conference. Regulators appreciate being asked anywhere; we are more likely to be told where to go. The following remarks are strictly my opinion. The accuracy of the projections is open to question but in D.C., accurate projections would go unrecognized anyway.

Fertilizer

Due to aquatic enrichment from surface water run-off and groundwater contamination by nitrates, the area of fertilizer use and the environment increasingly is a topic of concern. The following comments are innately difficult to make. Generally, I do not support ever expanding federal regulations. However, the time for a federal statutory umbrella governing fertilizer use has come and I believe will happen in the near future. This legislation need not be overly complex. It should be designed simply to mandate that fertilizers be used only when necessary, i.e. in accordance with the recommendations of a soil or tissue test. In addition, fertilizers especially nitrogen should be used with a best management strategy which maximizes absorption or uptake by the plant's roots and minimizes the likelihood of surface run-off or soil leaching. Due to its regulatory infrastructure, EPA is the logical federal agency to implement such legislation. EPA should be directed by congress to transfer "primary use enforcement authority" to the states, much like what is currently done under FIFRA. This way the requirements and BMPs could be tailored to meet site and crop specific conditions. Of course, such delegation of authority must be accompanied by a sufficient level of funding to the states to ensure a comprehensive, long-term program.

The reasons I uncharacteristically support this regulatory intrusion by the federal government are as follows:

1. The results of the groundwater survey revealed over 50% of drinking water wells contain nitrates above reportable limits; compared to less than 5% containing pesticide residues.

2. While the acute effect of nitrates are limited to the very young and are rare; the data base relative to potential long-term effects of low level ingestion of nitrates is insufficient. W/O sufficient testing one must err on the side of caution.
3. Unlike pesticides, fertilizers (at least NPK) are not sufficiently expensive to prevent overuse by producers or the general public. Over application to obtain maximum yield is alive and well.
4. The political reality is that unless a federal mandate exists, some states will be unable to establish the required regulatory control.
5. Consistency - we don't need 50 different state approaches. We need a practical, standardized program sufficient to address, not overwhelm the problem.

#### Pesticide Arena

In the pesticide arena, rightly or wrongly, regulations at the federal and state level will proliferate. Unfortunately much of the driving force will be perception rather than reality. The "Hollywood Acclaimed Missions" - HAMS for short are not likely to disappear. Regrettably, neither will the automatic transference by the public of scientific credibility to famous personalities, regardless of their degree of knowledge. But then who said life was fair?

I do not intend to bore you with excruciating detail about regulatory initiatives already proposed by EPA. However, I do want to discuss a major conceptual change necessitated by several up and coming federal regulations, i.e., endangered species, groundwater protection, worker safety, etc. In implementing these regulations, traditional enforcement measures simply will not work. This type of regulation will live or die on voluntary compliance! Voluntary compliance relies on education. The best education relies on consistent repeated concepts expressed by multiple sources.

The private applicator and the commercial applicator have reached a level of environmental sensitivity such that education will work. The regulated community must be taught their responsibilities, provided mechanisms for compliance and convinced that adhering to the ruler makes sense and has benefits for all of us.

Actually, I would like to see EPA, USDA and the states take this one step further and emphasize a pesticide education program. A program for everyone -- not tied to restricted use pesticides or certification and training alone. A major effort to inform the public about the safe use of all pesticides. General use products, available, to all of us, can cause significant environmental problems if misused or abused.

The largest single source of pesticide misuse is homeowners. Just because it is under the kitchen sink does not make it safe to overuse or spray everywhere. The homeowner doesn't understand that the chlorpyrifos under the sink is the same as the agricultural pesticide - Lorsban. Thiodan or endosulfan - one of the most toxic and environmentally persistent pesticides is still available to the public. Education is our only real hope at all ages and at all levels. I solicit your support for a general pesticide education program. Our efforts must be diligent and based on good science and aimed at changing behaviors. The public must be convinced to be good caretakers of everything under their control.

Next, I would like to mention several more specific concerns for the near future. These issues may not get all the press but I think these are real issues with significant potential ramifications.

- I. The continuing erosion of pesticide product availability should be a major concern. The forces creating this problems are multiple but the ultimate results are simple - fewer pesticides and fewer uses of remaining pesticides. Some of the causes are listed below:
  - A. Reregistration -- either the necessary data costs exceed the profit potential or other reasons cause the registrant to drop the chemical or certain uses.
  - B. Maintenance or registration fees result in marginal uses or uses with inherent liabilities being dropped by the registrant.
  - C. Suspension, cancellation or other regulatory restrictions can eliminate uses or entire active ingredients.

The lack of effective pesticide choices is particularly tough at a time when producers are being encourages to diversify. The minor use problem is complex and I see no simple solution. EPA, USDA and all of us will have to continue to work on this problem to find some way to keep the necessary pesticides available for major and minor uses.



II. Prevention rather than remediation should be the common goal of all pesticide programs. The groundwater protection strategy coming soon will emphasize this approach. However, prevention should be the primary target in many other areas, such as worker or public exposure, surface water contamination, excess residues on food. Again, we are back to education. Education that emphasizes up front that prevention is economically and environmentally efficacious.

### III. Efficacy

As you know, EPA removed the requirement for registrants to submit efficacy data years ago using the rationale that the marketplace would eliminate products which were not effective. For most products, this was well and good but not for all. EPA should require efficacy data, corresponding to the use rate on the label, for disinfectants and termiticides. Users cannot readily determine the effectiveness of these products. Congress is now interested in disinfectants and so I am sure EPA will also be. However, the new generation of termiticides are not receiving attention and we may pay for that with our homes. Data should be required to assure that the new generation of termiticides are protecting our structures or the registration should be revoked.

### IV. Certification and Training (C. & T.)

EPA's proposed revised C. & T. regulations were published earlier this month in the Federal Register with 120 days allowed for comments. The changes are numerous and significant. The definition of "use" is expanded to include application; mixing, loading, transport, storage and handling after the container's seal is broken and disposal as instructed on the label. This is important because a certified applicator will have to perform or supervise all those activities if the pesticide is an RUP.

It will also require verifiable training or non-certified applicators and would require the same general levels of competency for private and commercial applicators. Under the proposal, recertification would be required every five years. The regulation would establish 3 levels of supervision instead of 2: use by a certified applicator only; use under supervision of a certified applicator on site and available within five minutes and use under instructions of a certified applicator available in a reasonable amount of time. This will definitely require more work for the Cooperative Extension Service and State Lead Agencies. The changes are significant and deserve your review and comments.

Now for the two issues which receive the vast majority of the press: Groundwater Protection and Food Safety. These issues receive an inordinate amount of attention by EPA, USDA and subsequently the states.

#### IV. Groundwater

The results of the nationwide groundwater survey show that with the exception of nitrates, there is not widespread contamination of our national drinking water. While, efforts to mitigate any additional contamination certainly should continue, it should be kept in proper perspective. Monitoring, both soil and water, should continue. When a potential problem is found, comprehensive evaluations should be made with the goal of ending contamination not automatically use.

#### Food Safety

This HAM is another issue that is largely perception rather than reality. We have the safest food in the world. Pesticide residues are not a significant health problem but fear is easy to sell. When a pesticide is identified as a problem, EPA should expeditiously cancel its registration but only for scientifically valid concerns. The efforts of a famous personality or two coupled with a "public interest group" should never be considered sufficient justification for cancellation of a product. Only science should be considered.

It is also inappropriate to focus on pesticide residues which are not a major problem. The ensuring decrease of emphasis and education about the real food problems; nutrition and microbiological contamination, is counterproductive and a real danger to your health.

# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

United States Department of Agriculture  
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## **CHANGING CHEMICAL USE: THE IMPACT ON PRODUCERS AND CONSUMERS**

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### **Introduction:**

Both producers and Consumers of food products must realize that there are very good reasons why we are where we are today; why we use chemicals in food production and the extent to which we use them. We must also recognize that the consuming public has very genuine and deep concerns about their use.

From the food production side, chemicals are used to increase production, reduce the variability in production from year to year, substitute for other inputs to production like labor and machinery, preserve the product once it has been harvested, and to meet the marketing demands for a standardized and attractive looking product. On simple economic grounds it has paid farmers to use increasing amounts of chemicals over a number of years. From the period 1948-52 to 1983-87 national average land values have increased almost thirty-fold, farm machinery costs have gone up by a factor of nine, labor costs have increased five-fold, and agricultural chemical costs have only doubled. Chemicals have been increasingly cheap substitutes for other inputs.

Simultaneously, consumers have had increasing concern about agriculture's use of chemicals. Many consumers believe that this use is still increasing and many believe that it is haphazard. Agriculture has to face this widely held perception even though chemical application is increasingly prescribed and regulated, and despite the fact that chemical use is declining for many crops in many regions. The expectation is that chemical use will continue to decline and that the use of agricultural chemicals will be increasingly proscribed. Chemical use will change.

### **Driving the Change in Chemical Use:**

The economic benefit of chemical use for many producers is so strong that I see little chance of change in the relative cost and value to production of chemical inputs which would be sufficient to drive any significant reduction in chemical use. For example, the value of nitrogen fertilizer to corn production in the Midwest is such that it would be necessary to have a tax doubling or tripling the cost of nitrogen in order for the increased price to induce farmers to make basic shifts in corn fertilizer use or cropping patterns. Economic studies have repeatedly documented high returns to most chemicals used in agriculture.

Major changes in chemical use will come through public policy actions that provide strong market incentives to change chemical use, or from the regulation of chemical use.

### Public Perception and the Regulation of Chemical Use:

The operative question is; what objectives are desired by the public, and how will the changes required for these objectives impact producers? Consumers are saying that they want as little risk from chemicals associated with food production as possible. This by itself is not an unreasonable position. The critical question is, what are the trade-offs in achieving this goal. These are trade-offs involving the quantity, quality, price, seasonality, and distribution of food - as well as trade-offs between competing or conflicting goals with respect to consumers' objectives about food. It is the disregard of many of these trade-offs that has made the debate on appropriate regulation of chemicals for health goals so difficult.

### What Are the Impacts of Chemical Reductions Claimed To Be?

The recent debate over Proposition # 128, Big Green, in California provides us with many estimates of the range of perceived impacts from more stringent chemical regulation. Proponents believed there would be real health benefits, on the one hand, with little or no costs to agricultural production, food prices, etc. on the other hand (NRDC and David Pimentel). Opponents believed that there would be little real benefit to public health, a reduction in the quantity and quality of foodstuffs, and an increase in the price of food (Dr. Koop, Professor Ames, and GRC Economics).

How one views the health benefits of chemical restrictions partially depends upon whether one concentrates on specific instances or trade-offs that include a broad view of health and diet. Expert opinion is especially divided when considering secondary effects and trade-offs from a major chemical ban or reduction intended to improve health. Yet, there are cases that raise real issues of health risks with current chemicals or with the way they are utilized in food production. The scientific community appears to be divided over the evidence, both within a given frame of analysis, and, especially between different frames of analysis. This has left the benefits side of chemical reduction in a state of great confusion and up for grabs.

Agricultural scientists should be able to give a clear indication of the impacts of changes in chemical use on the production, prices, quality and availability of food in contrast to the confusion about health impacts. However, this was not the case during the California debate because different analysts made their estimates with different assumptions and under different frames of analysis. Thus, the cost side was not very clear either.

### What Determines the Impacts on Production?

When we change incentives for using chemicals, restrict them, or ban them we are forcing a change in production technology. In a graphical sense, we are backing down the production function - something we have very little data about or experience in doing. The effort led by staff at Texas A&M to look at major chemical bans depended upon a delphi process of consultation with those experts willing to try to guess from their experience what production declines might actually be. The basic information about the initial physical response of crops to major



chemical reductions is simply lacking. There are some educated guesses available, but they must be regarded as such, not as hard data.

In addition, over time there are a number of mitigating adjustments that reduce the initial impact of this change. This is illustrated in Figure 1. If one wants to show the maximum disruption from the change, one only looks at the initial shock. This is in contrast to looking at the impact over time. If one wants to show the minimum disruption from the change one highlights the end of the period of adjustment to the chemical change. The assessments we have seen so far have highlighted either the initial shock (to show a change has terribly high costs) or has highlighted the tail end of the adjustment process when a number of the mitigating adjustments have taken place (to show how little impact a change would have).

These adjustments are terribly important. They include things like changes in trade, adoption of new technology, changes in resource use, and the use of substitutes. Work I was involved in earlier this year which looked at large scale chemical reductions in the production of major feed grains were very sensitive to (ie mitigated strongly by) changes in imports and exports. Especially at the time of the initial shock of chemical reduction, there was only very moderate impact felt by the American consumer on the supply, availability and price of foodstuffs, if the trade sector was allowed to take up a big part of the adjustment. What this says is that the rest of the world acted as a shock absorber.

Different Crops are also very different in their response to changes in chemical use. Some crops are easily grown with existing substitute chemicals that do the job and are not much more costly. Other crops, like off-season soft fruits from California depend upon fungicides for which there are now few substitutes. The quantity and price impacts of chemical bans would be much more severe here.

Changes in the seasonal availability of some fruits and vegetables and changes in the location of production of these foodstuffs will be major initial impacts from changes in chemical use. As consumers adapt to these changes the newly located and differently timed production will be a part of the mitigating adjustments.

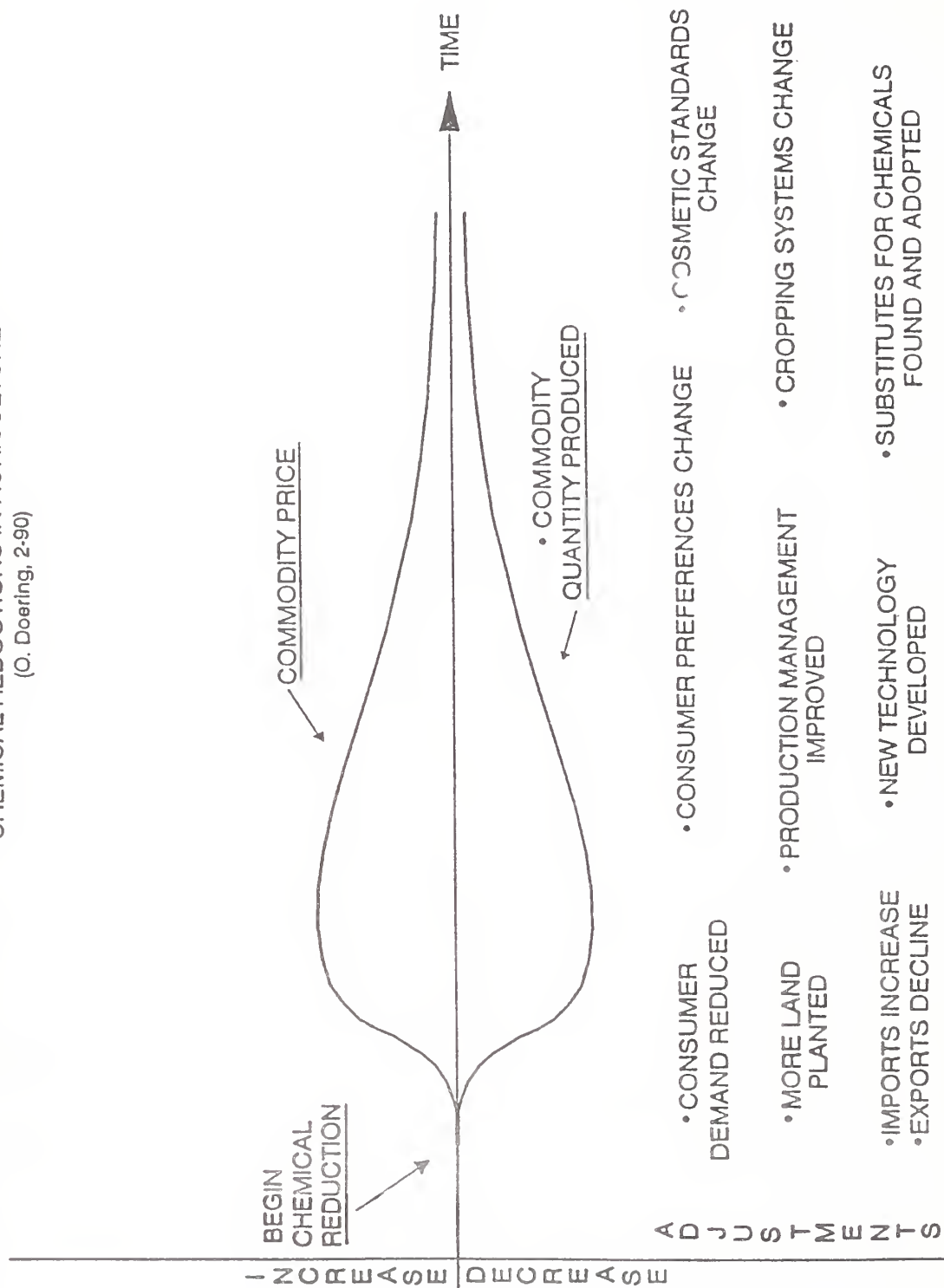
How the chemical reductions are actually brought about will also have a great deal of influence on the impact of such a reduction. The impact from a sudden and complete ban will be different from a phased reduction or more stringently controlled application procedure. A reduction brought about by economic incentives, like a tax on the chemical, will have different impacts and greatly affect who pays and who benefits.

### Where Does All This Uncertainty Leave Us?

Above all, it appears certain that agriculture will be required to reduce the amount and toxicity of chemicals it uses. This can be done in ways so that adjustments can be made and the impacts upon agricultural producers and consumers are moderate. There will probably have to be some change in consumer preferences, but it is hoped we can maintain recent improvement in diets to include more fruits and vegetables. As we move into this process it will help if the restrictions on chemicals are specific because of specific problems, rather than categorical. This will allow us to better measure impacts and also likely involve easier technical adjustments to do without the material in question.

Probably the most important consideration will be public faith. If the public does not trust agriculture to actually modify practices to meet important perceived

FIGURE 1  
MITIGATING ADJUSTMENTS TO SUDDEN  
CHEMICAL REDUCTIONS IN AGRICULTURE  
(O. Doering, 2-90)



public health concerns, then the meat axe approach will be taken to chemical reductions which will guarantee high impact upon farmers and production. Part of the requirement here for public trust will be a better understanding of health risks and benefits and more agreement on these risks so that very small health benefits will be less likely to be sought at high cost to agriculture.

If the public does not gain a better understanding of the nature of the health trade-offs from chemicals, and if there is not some general agreement on where truth lies, then we will continue to face great polarization over the issue and repeated attempts to institute broad and complete bans of agricultural chemicals. On the cost side, it will also help for agriculture to do a better job trying to estimate the impacts of a variety of different approaches to chemical reduction to demonstrate that there are alternative ways of meeting demands for chemical reduction.

# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

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## **EDIBLE AND INDUSTRIAL RAPESEED OILS**

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Unprecedented opportunities will be available to U.S. agriculture to develop a rapeseed industry in the next decade, in my judgement. Consequently, I welcome the opportunity to visit with you about both edible and industrial rapeseed oil. Initially I would like to share with you an overview of my presentation and, then, with the benefit of visual aids, discuss and illustrate aspects of this unusual opportunity for economic development.

This presentation will have four foci. First, I will discuss the terms involved. Second, I will try to consider some relevant concepts following a dual track, i.e., with regard to high and low erucic acid oil rapeseed at the same time. Third, past trends for both will be considered. Finally, the future outlook for both edible and industrial rapeseed will be examined.

### **Clarification of Terms**

Table 1 identifies some terms for both crops that deserve attention. Noteworthy is the fact that edible rapeseed oil carries a number of other names. One is low erucic acid rapeseed (LEAR) and the other is Canola (an acronym for Canada oil, low acid). Similarly, industrial rapeseed carries the acronym of high erucic acid oil rapeseed. This is abbreviated as (HEAR). Erucic acid is a  $C_{22}$  with a single double bond. Hence, it is not economically feasible to synthesize and only four domestic crops fix it. Of those, rapeseed is the most developed with respect to commercialization.

Print # 1 shows a field of commercial rapeseed production in Idaho at the time of bloom. Print # 2, likewise, shows the same picture. This is not an accident, but rather a deliberate duplication of prints to reinforce the point that one cannot identify the difference between the two types of rapeseed via visual inspection. This is true both for the plants and for the seeds themselves. As a matter of fact, I understand that a simple chemical test that might be placed in grain elevators where the seed is purchased is not available. Rather, a relatively



sophisticated chemical test is required to determine whether or not the oil is high or low in erucic acid. This suggests a problem to which I will return later in the paper.

**TABLE 1. SELECTED ASPECTS OF EDIBLE AND INDUSTRIAL RAPESEED**

<b>A. CROP:</b>	<b>EDIBLE RAPESEED</b>	<b>INDUSTRIAL RAPESEED</b>
<b>B. OTHER TERMS:</b>	Low Erucic Acid (LEAR) Rapeseed Canola (Canada oil low acid)	High Erucic Acid Rapeseed (HEAR)
<b>C. CHARACTERISTICS:</b>	Less than 2% erucic acid Low glucosinolate meal	Approximately 42% High Erucic Acid Oil High glucosinolate meal
<b>D. OTHER CROPS/PRODUCTS:</b>	Wheat (U.S. farmer) Soybeans (U.S. consumer)	Crambe (U.S. farmer) Petroleum (U.S. consumer)
<b>E. POSSIBLE MARKETS:</b>	Edible oil & livestock rations	Plastics, lubricants, industrial paints & coatings, and livestock rations

Table 1 also indicates characteristics common to the edible rapeseed which I will subsequently refer to as Canola. That is, Canola must have less than 2% erucic acid and also be low in glucosinolate, a toxic substance in the defatted meal used as a protein supplement for livestock, in order to be referred to as double low rapeseed. As a matter of fact, the erucic acid and the glucosinolate contents tend to be highly correlated. In many cases a variety that is low in erucic acid is also low in glucosinolates. That enables it to penetrate feed markets for monogastric animals, in addition to ruminant animals. Under the industrial rapeseed heading, note is made of the fact that many varieties contain approximately 42% erucic acid. Likewise, the meal tends to be high in glucosinolates from these. Print # 3 shows the primary derivatives of both the meal and oil fractions of industrial rapeseed.

Table 1 indicates that there are associated crops or feedstock sources that need to be mentioned with regard to both of these types of rapeseed. From the viewpoint of the farmer, wheat is such a relevant crop because of the fact that in most parts of the U.S., both Canola and industrial rapeseed are planted in the fall and are

combined at approximately the same time as the wheat.<sup>1</sup> From the standpoint of the consumer, soybeans may represent the most closely related crop in that some of the food products presently produced from soybeans also can be produced from Canola. As far as industrial rapeseed is concerned, a closely related crop that deserves comment is Crambe. A field of Crambe is shown in Print # 4. A farmer can consider Crambe as another source of high erucic acid oil. But in this case, the crop would be produced as a spring planted crop rather than a fall planted one like most U.S. produced rapeseed. Finally, from the standpoint of the consumer, many commodities can be produced from industrial rapeseed oil that are being produced now from petroleum. These include fuels illustrated by the tractor in print # 5, as well as a multitude of other products depicted in print # 6. The most frequent use presently made of this material is as an anti-block, slip agent in plastic films, as illustrated in print # 7.

Table 1 also lists the possible markets for both types of rapeseed. The edible oil market is important in that a number of other companies have followed the leadership of Procter and Gamble -- the company that introduced Canola oil to the U.S. market in the form of Puritan brand cooking oil. In addition, livestock rations containing Canola meal can be prepared for monogastrics as well as for beef cattle. Meal from industrial rapeseed has been fed in beef cattle rations for many years, as shown in print # 8. Preliminary indications are that an improvement in carcass quality may result from feeding meal from industrial rapeseed.

### Past Trends

Several past trends will be discussed briefly in this section. These include the experience of rapeseed, particularly in Canada, in the World War II to present period. Development of new market opportunities in the U.S. during this time frame also will be discussed. The focus on nutrition that is driving the Canola oil market will be worthy of elaboration in the next section. The concluding part of the discussion will concern production and import trends that have marked the industry.

Prior to and during World War II, high erucic acid rapeseed oil was the lubricant of choice in steam engines. This was because of the fact that the oil has a very low propensity for absorbing water. However, when steam engines were replaced by diesels in the post World War II period, the market for industrial rapeseed oil

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<sup>1</sup>Spring seeded varieties of rapeseed are very important in countries with colder climates than the U.S. (Canada) But where agro-climatic conditions permit both to be grown, spring seeded varieties usually experience a substantial yield reduction relative to the fall seeded ones.

essentially evaporated. As a result, the production of rapeseed in Canada dropped to extraordinarily low levels.

The Canadian research community made a deliberate decision to attempt to genetically modify the rapeseed plant in order to produce an oil that could penetrate the edible oil market. This effort was remarkably successful and Canola has been the Cinderella crop in Canada for the last several decades.

Two remaining historical facts need to be underscored. One is that rapeseed has been a plant oil produced in various parts of the world for centuries. It is hardly a "new" crop in an international sense. The other is that a major effort to expand rapeseed production in the Economic Community has been motivated by the interest in backing out U.S. soybean imports. The last data I have seen indicate that the Community presently is the largest producer of rapeseed in the world.

Independent of the Canadian genetic efforts, U.S. scientists during the post World War II period worked on the utilization of high erucic acid oils. Much of this work was undertaken by the Northern Regional Research Laboratory of USDA in Peoria, Illinois. Dr. Kenneth Carlson, along with colleagues, was responsible for the development of a high grade industrial nylon named Nylon 1313. For reasons to be discussed later, this technology has not been adopted for the production of a commercial product in the U.S. Nevertheless, for many uses, especially under the hood of an automobile, this high quality industrial nylon has tremendous potential.

Starting in the 1950's, Procter and Gamble began to monitor nutrition research done at a number of sites. As information became available, the company deliberately decided to modify their edible oil products. Initially, they provided leadership in shifting to plant oils, especially soybean oil, as a feedstock for a number of their products. Likewise, as increasing nutritional information became available, they made the decision to offer the market its first edible oil based on Canola. Print # 9 illustrates the low level of saturated fats, relative to other vegetable oils. Thus, from a nutritional point of view, this oil is considered to be very healthy. Clearly, this is the force that is driving the Canola industry and it is likely to continue to be a major force in determining market shares in the edible oil markets, in the foreseeable future.

As a result of the demand curve shifting to the right very rapidly for Canola oil, imports of that material have grown in the United States. This is shown in print # 10. Simultaneously, efforts have been made by several companies to initiate the production of Canola on U.S. farms. One of those providing leadership in this area is Calgene, Inc. which is involved via its



Ameri-Can Seed Co., its crushing plant in Chattanooga, Tennessee (which is a joint venture with Central Soya) and Calgene Chemical, a major importer of rapeseed oil. At present, the estimate is that the oil from the equivalent of 500,000 acres of production of Canola is imported annually into the U.S.

### **Future Outlook**

In this concluding section, Canola will be discussed from a demand perspective. Also, industrial rapeseed will be considered with regard to potential market growth. On the supply side, the uncertainties introduced by biotechnology will be discussed in the third section. In addition, the potential for economic development that accompanies these crops will be considered. A major public policy issue will be considered in my concluding comments. However, before proceeding to these matters, a digression is in order concerning the 1990 Agricultural, Conservation, and Trade Act (Farm Bill).

### **A Digression Concerning the 1990 Farm Bill**

With regard to diversification, the 1990 Farm Bill is probably the most progressive piece of agricultural legislation passed during my lifetime. The New Farm and Forrest Products Task Force, on which I served as a member, identified a national policy goal of diversifying 150 million acres during the next 25 years. The recently passed legislation will contribute to this policy objective in four ways.

Establishment of the triple base deals with one past problem. Now farmers will be able to plant 15% of their base acreage to any crop except fruits and vegetables without loss of base history for future years. In the case of program crops and oilseeds, their production will be eligible for loan.

The second assist provided by the Act is the non-recourse marketing loan programs established for canola, rapeseed, sunflower, safflower, flaxseed, and mustard seed. The effective loan for these oilseeds is 8.7 cents/lb. -- an important price safety net.

The third positive contribution of the Act is the so-called Oilseed 0-92 provision. (Some have informally renamed it the 0-77 provision, allowing for the 15% reduction due to the triple base.) Under this provision farmers may plant any oilseed crop other than soybeans on all or part of their acreage base and be eligible for deficiency payments on a percentage of the enrolled acreage. This will be extremely helpful in establishing a canola industry, making progress in the promising area of commercializing plant oil fuels and providing assurance of an available supply for such products as industrial nylons as well as paints and coatings.



The final major authorization of the Act is the authorization of the Alternative Agricultural Research and Commercialization Center in USDA. Once funded, it will provide bridge financing needed to help commercialize new products from existing as well as new crops.

Congress and the Administration are to be strongly commended for providing these features in the Act. They are consistent with the long range objective of diversification. They hold promise of stimulating economic development in rural areas. They encourage use of renewable resources. In brief, they hold substantial promise of being viewed by historians as a significant turning point in U.S. agricultural policy.

In the Agricultural Economics profession, demand analysts' "Holy Trinity" with regard to shifts in demand curves has been: 1) income, 2) population, and 3) changes in tastes and preferences. Clearly, Canola represents the latter. The demand curve has been jumping to the right at a rapid pace. One firm that has examined the situation, Experience Incorporated in Minneapolis, Minnesota, has reached the conclusion that domestic production is likely to double by 1995 and that Canola is likely to penetrate the market to the extent of 17% by the year 2000. At present it has 1% of the market. This is shown in print # 11. As major firms like Frito Lay begin to shift to this perceived healthier cooking oil, a domino effect can be expected in the industry. In spite of the fact that the 1990 Farm Bill contains powerful incentives to increase Canola and other minor oil seed production, it is doubtful that domestic production will catch up with demand by the midpoint of the decade. In brief, this is one part of agriculture where a dynamic demand is calling for increased production.

In the case of industrial rapeseed, the situation is quite different. The plastic film industry demands erucimide only to the extent of the equivalent of about 50,000 acres per year, as stated above. Little growth is anticipated in the foreseeable future in this market. However, because of its chemical characteristics of being a  $C_{22}$  long-chain fatty acid with a single-double bond, high erucic acid rapeseed oil is a "chemist's dream." As suggested above, major research investments are being made to explore the potential for making nylon, industrial paints and coatings, lubricants, and other industrial oils from this material. Rather than a steady shift of the demand curve to the right, in the case of industrial rapeseed, the potential exists for extraordinarily abrupt shifts to the right which would be occasioned by the demand of new industrial plants coming on stream that utilize this feedstock.

Rapeseed is a plant of choice in many biotech research efforts. Unfortunately, information is not readily available concerning progress toward developing significant modifications of

the rapeseed plant. However, there is widespread speculation that the plant may be modified soon to be resistant to certain herbicides. The implications of such new technology for production are obvious.

### **Implications and Conclusions**

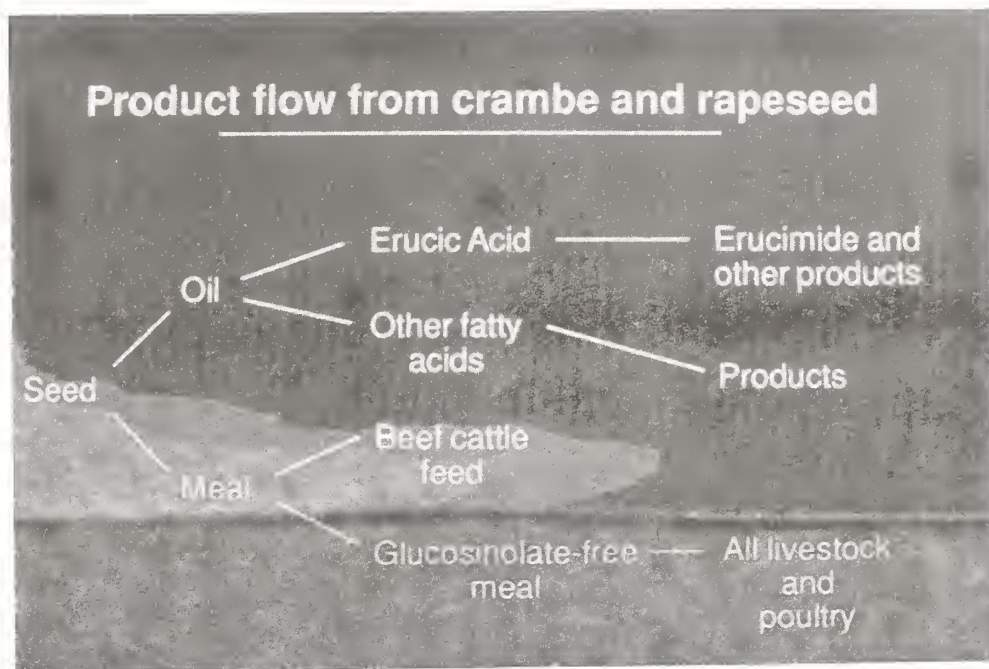
Most economists would characterize the agricultural sector of the United States as a mature, somewhat stagnant one. This is not the case for rapeseed. Especially in the instance of Canola, potential growth is obvious. If, at the same time, breakthroughs are made in developing industrial materials from high erucic rapeseed and biotech innovations result in lower production costs, industrial rapeseed could join Canola in being an extraordinarily dynamic component of the U.S. economy.

One major public policy issue must be resolved if both types of rapeseed are to come into widespread production. Due to the fact that they cross-pollinate, as is illustrated in print # 12, an effort must be made to keep the two crops separated. If that is not successful, the resulting oil will be too high in erucic acid to enter the edible oil market and too low to be economically attractive in the industrial oil market. The fact that no simple chemical test for erucic acid is available to determine its percentage makes this a difficult problem. Consequently, in some states growing districts have been identified to prevent the cross-pollination problem from occurring. In those parts of the U.S. where rapeseed can be produced profitably, state governments are urged to deal with the issue before vested interests become clearly established in growing both types in the same geographic region.

Prints # 1 and 2



Print # 3





Print # 4



Print # 5



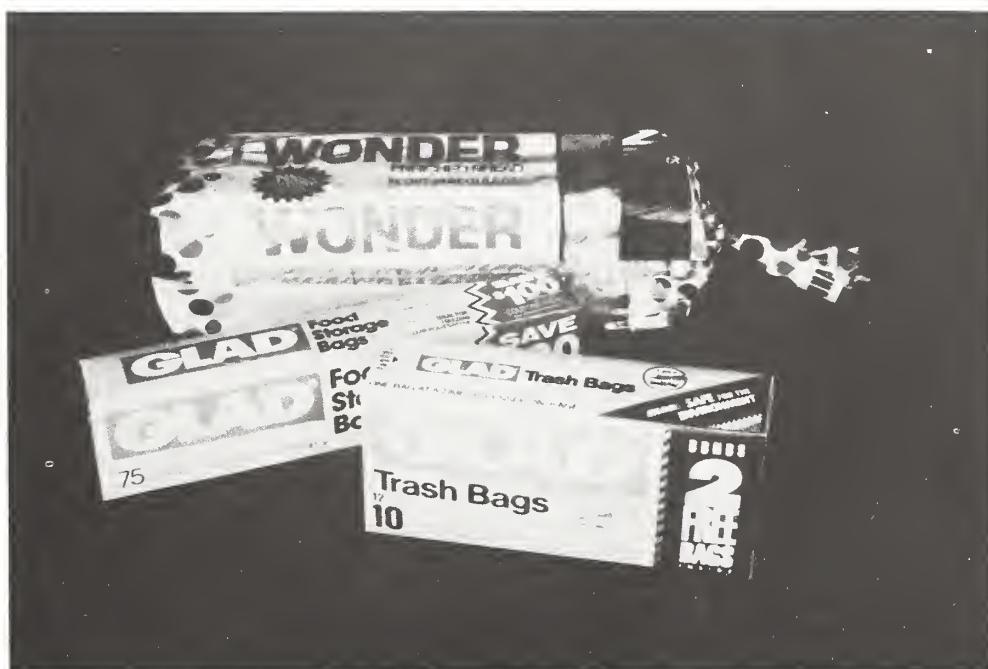


Print # 6

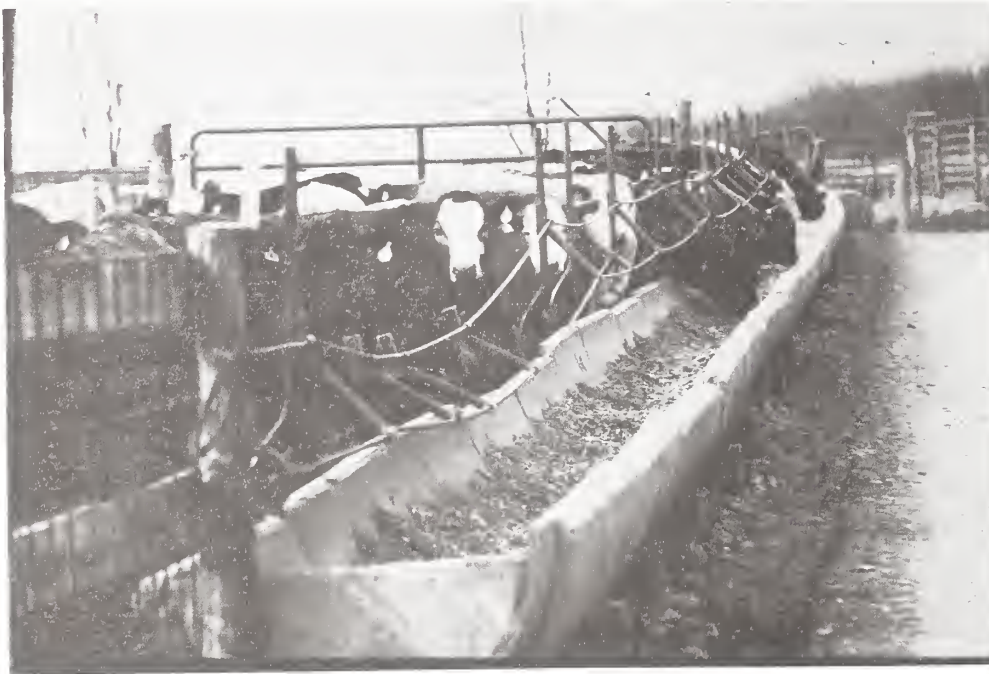
## Potential Uses for Erucic Acid

Slip Agent  
Dielectric Fluids  
Nylons and Plastics  
Lubricants  
Heat Transfer Fluids  
Paints and Coatings  
Flotation Agents  
Surfactants  
Pharmaceuticals  
Cosmetics

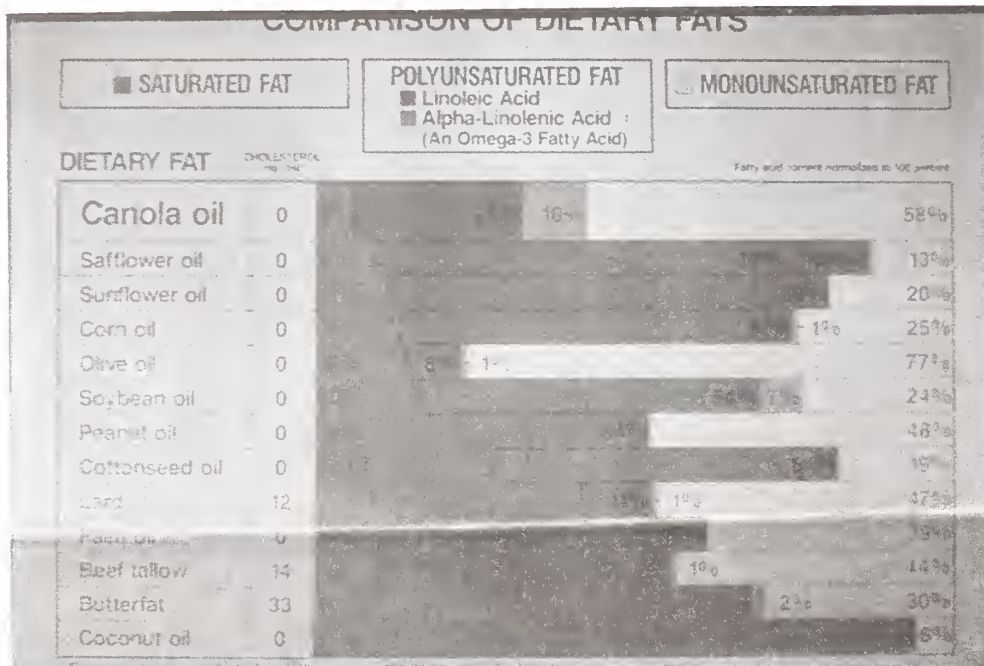
Print # 7



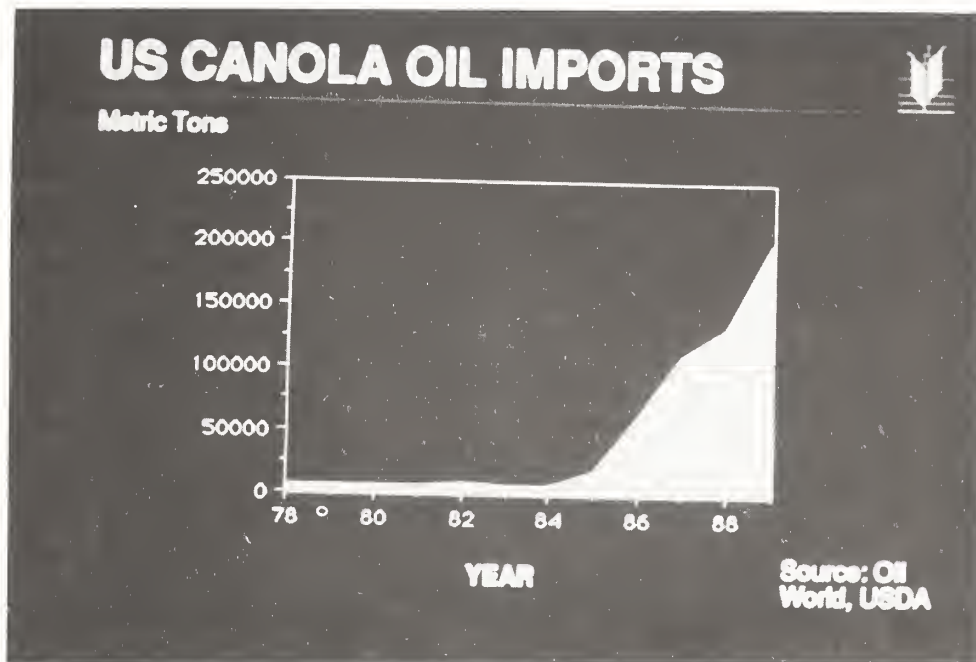
Print # 8



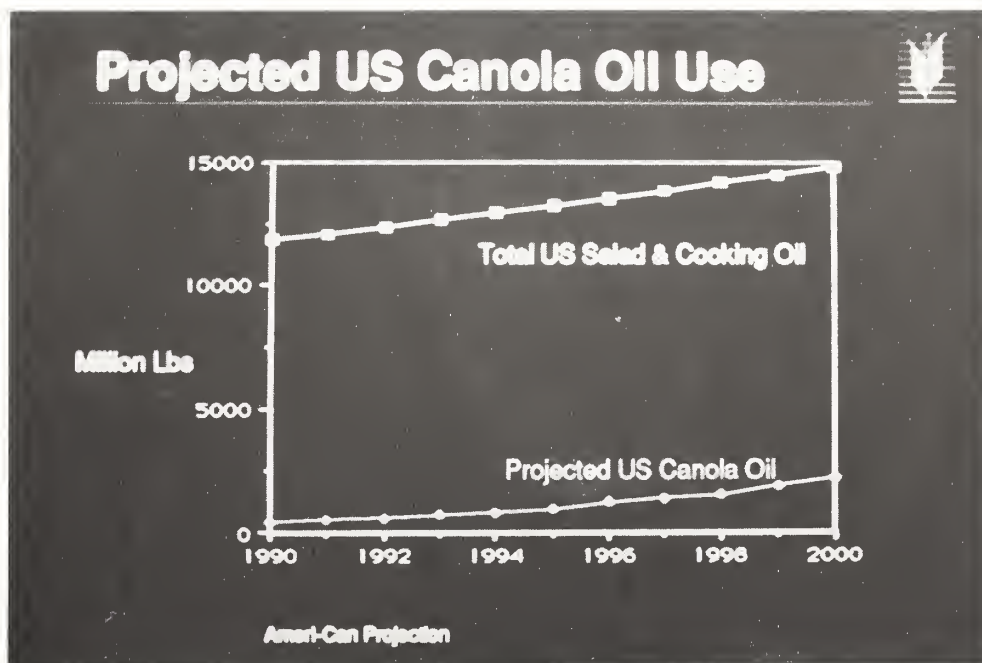
Print # 9



Print # 10



Print # 11



Print # 12





# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## PROMISING NEW PRODUCTS AND PROCESSES FROM CORN

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Although development of new or expanded industrial (nonfood) markets for corn has been of concern for several decades, perhaps interest has never been more intense than in recent years. This interest has been fueled by corn production in excess of existing markets that resulted in ending stocks (surplus) of more than 4 billion bushels (bil. bu.) in three successive years from 1985-1987. Carryover from the 1985 crop of 4,039 bil. bu. plus 1986 production of 8,253 bil. bu. provided a corn supply of nearly 12.3 bil. bu. for 1986. Since the domestic plus export market for corn in 1986 was 7.4 bil. bu., a surplus of nearly 4.9 bil. bu. resulted. Even though 1987 corn production was about 12% less than in 1986, still, ending stocks in excess of 4 bil. bu. were carried into the 1988 crop year. The severe drought in the 1988 crop year reduced yield to slightly less than 5 bil. bu. reducing the carryover into 1989 of about 2 bil. bu.

As yearly corn production returns to 8 bil. bu. plus, and approaches the projected 10 bil. bu. mark within the next several years, new domestic markets will be needed to avoid the large surplus of the middle 80s. Domestic consumption has been increasing as markets for food, alcohol and industrial use rose by more than 600 million bushels during the 1980s, reaching a level of 1.3 bil. bu. in 1990.

New products and processes from corn are continuing to emerge, promising greater utilization of this major crop. Increased utilization will result in improved economies through increased domestic processing and value added products, replacement of products derived from imported oil, and products from natural sources that are environmentally more acceptable.

Although most of the products from corn milling are for food and feed purposes, this industry provides about five billion pounds of starch, largely

for a variety of industrial purposes. It is the area of industrial opportunities for starch that the current paper will address. We want to examine briefly the current industrial markets for starch and look to the future for new and expanded markets for this component that makes up about 70% of the corn grains' composition.

#### CURRENT MARKETS

The inherent adhesive and film-forming properties have earned starch a sizeable market in paper applications. Currently, about three-and-a-half billion pounds of starch are used in paper, paperboard, and related industries where starch serves a variety of adhesive functions. A broad spectrum of chemically, physically and biologically modified starches have been developed to build in the properties required for specific end-use application. Largely through continuing efforts to determine the precise property required for a specific application, the researcher has come up with appropriately modified starches that have allowed starch to realize continued market growth in many adhesive applications. There is good reason to believe that starch will continue to enjoy expanding markets in the paper and paperboard industries.

The textile industry provides a market opportunity for several hundred million pounds of starch products. The principal use is as a warp size to strengthen warp yarns and improve their resistance to abrasion during weaving. They also are used in the finishing of fabrics and in printing. Unfortunately, starch has not retained its share of the market it had at one time due to its replacement by petroleum-derived (synthetic) polymers. However, in order to maintain a good share of the market, starch scientists have developed several modified starches that function alone or in combination with synthetic polymers to meet end-use requirements. Opportunity exists to capture a larger share of the market through the design and development of specifically tailored starch products. Meeting this challenge is certainly not beyond the capabilities of the starch scientist.

Beyond these major markets in the paper, paperboard and textile industries, starch, modified starch, starch-derived dextrins, oligo-saccharides, and glucose are used in a myriad of ways to thicken, flocculate, stabilize, absorb, coat, adhere, dry, moisten, etc. Scores of starch-derived products are marketed to serve specialized needs of numerous industries. Again, these markets exist because of the recognized needs of a particular industry and the efforts of the starch scientist to develop a product to meet a particular requirement.

#### NEW MARKET OPPORTUNITIES

The major markets targeted for replacement by starch are those served by petrochemicals. It is understandable why this is so, starch being annually

renewable, produced in great abundance with opportunity to produce even more, reasonably inexpensive and convertible chemically, physically, and biologically to a broad array of useful low-molecular-weight compounds and polymerics. Although, technologically, it is possible to produce essentially all of the petrochemicals from starch, it is unreasonable, especially in the near term, to consider starch as a source for all petrochemicals. While we should not expect starch to become a source of all the chemicals now derived from petroleum, there are many opportunities to replace some of these chemicals either by direct substitution or by substitution of an alternate chemical. Advantage might accrue where the starch-derived alternate provides improved functionality and brings benefit to the end-use application.

We are now witnessing the entry of starch-derived products into market areas traditionally serviced by petrochemicals. Some of these products are alternate in structure to the traditional materials and do bring a beneficial property. We want to look at some of these materials and how they are being used as well as additional market opportunities for them and other starch-derived products. Let us classify and consider these products as either low-molecular-weight chemicals or as polymerics.

#### LOW-MOLECULAR-WEIGHT CHEMICALS

It has been stated that technologically starch could be used as a raw material to produce any chemical now derived from petroleum. Indeed, starch could be treated at high temperatures to yield synthetic gas (carbon monoxide and hydrogen) which can be further processed to a wide variety of chemicals. However, it is unlikely that starch will serve such a purpose to any considerable extent. Rather, the most likely consideration for chemicals from starch will derive from the glucose formed on depolymerization of the polysaccharide. Commercially, starch is efficiently converted by appropriate enzyme treatment to give nearly the theoretical yield of glucose.

Since starch and glucose contain approximately 50% oxygen, it is obvious that the greatest mass yield of conversion products will arise from those that retain considerable amounts of the oxygen. It is primarily for this reason that the greatest opportunity for replacing petroleum-derived chemicals will be those that contain oxygen. Of the more than 200 billion pounds of petroleum chemicals produced in this country each year, about 25% are oxygen-containing. It is this 50-billion-pound market that shows the most promise for replacement by products from glucose.

Glucose can be converted to a variety of alcohols, cyclic and acyclic polyols, acids, aldehydes and ketones. Both chemical and biological processes are now employed commercially to provide selected low-molecular-weight chemicals from starch or starch-derived glucose.

Industrial fermentation is now used to produce the alcohols, ethanol, isopropanol and butanol; the polyols, glycerol and 1,4-butane diol; the ketone, acetone; and the acids, acetic, citric, gluconic, itaconic and lactic. Many of these oxygen-containing chemicals also are produced from petroleum, thus keeping the market share quite small for some of the fermentation products.

Ethanol is the chemical produced in greatest abundance from glucose. In 1990, the production of ethanol for the domestic fuel market will utilize nearly 385 million bushels of grain to produce the 950 million gallons to be blended with gasoline. Although the debate continues over the production and use of ethanol from grain as a gasoline additive, as oil prices rise and supplies diminish, and as technology improves for more efficient biological production and recovery of ethanol, the market for this alcohol will continue to expand.

Currently produced from starch are polyols that compete well with synthetic polyols such as pentaerythritol. Sorbitol, now produced in excess of 200 million pounds, is used extensively for making surfactants and emulsifiers, especially for food applications. Smaller amounts of sorbitol are used in making specialty polyethers for urethane foam production.

Methyl and other alkyl glucosides are being produced commercially by the Horizon Chemical Division of A. E. Staley. They are useful in applications such as surfactants, alkyds and urethane foams. Detergent applications for the glucosides could continue to increase because of their functionality and biodegradability. Since petroleum-derived polyols enjoy a multibillion-pound market, ethylene glycol alone accounting for 5 billion pounds, research leading to new and improved technologies for starch-derived polyols could be most rewarding.

New market opportunities are emerging for the carboxylic acids produced by fermentation of starch-derived carbohydrates. Acetic acid, now produced mostly from petroleum-derived ethylene, and in small amount from fermentation of sugars, has been undergoing evaluation, after conversion to calcium magnesium acetate (CMA), as a deicer salt for highways. In 1982, the Federal Highway Administration initiated a program for complete evaluation of CMA as an alternative deicer to the corrosive sodium chloride-calcium chloride salt now used. Reports from studies conducted under this program and from various other projects and researchers suggest CMA is considerably less corrosive than the salt currently used and would have little deleterious effect on plants or animals. One company marketed the deicer in the 86-87 winter. Although CMA can be derived from synthetic acetic acid or from biomass other than corn, corn growers remain hopeful that a sizeable new market for corn will result from widespread use of CMA.



Other oxychemicals such as acrylic acid, ethylene glycol, propylene glycol, methylethylketone, maleic anhydride and fumaric acid can be produced via fermentation routes. To capture a significant portion of the market for these and other oxychemicals, we must see further advances in bioconversion technologies. Organisms must be identified or developed that are more efficient in producing the desired product in higher yield, at a faster rate, and at higher glucose concentration. New bioreactors are needed to permit continuous processing, mixed-culture fermentations, and the use of solid substrates. Improved engineering (chemical and bio) technology for separation, recovery and purification of fermentation products will contribute significantly to the realization of expanded markets. As there will be byproducts in any fermentation process, efficient technology must be developed for their separation and recovery, and appropriate markets must be identified. Fortunately, we have witnessed during the last several years a research commitment addressing these various needs.

#### POLYMERIC CHEMICALS

The dramatic market growth of petroleum-derived polymers over the last several decades has attracted the attention of starch researchers for some time. Effort has been made to recapture some of the traditional markets in paper and textiles lost to the synthetics as well as to capture a share of new markets emerging for polymers. In order to enhance the functionality of starch, a broad range of chemical reactions has been conducted including crosslinking, oxidation, esterification and etherification. Several of these modifications have resulted in commercial products. Improved conversion technologies that result in more efficient reactions with better separation and recovery of product should allow the starch products to become more competitive.

A large portion of the chemicals produced from petroleum is utilized to manufacture the nearly 60 billion pounds of synthetic polymers now used annually in the United States. Plastics, which now account for about 75% of the total synthetic polymer production, will double in usage volume during the next decade if raw materials are available. In recognition of this growth potential and the uncertainties in availability of sufficient petroleum feed stocks, interest has increased in the use of natural polymers as extenders for plastics or as total replacements for certain types of plastics. Not only is it the renewable aspect of raw materials such as starch that has piqued the interest of industry and the public, but also the potential of such natural polymers to impart degradability to fabricated materials.

#### Biopolymer Plastics via Starch Fermentation

Fermentation of starch or starch-derived sugars has long been practiced to produce a variety of acids. One of the acids, lactic, has received

considerable attention as the basis of biodegradable thermoplastic polymers with a host of potential industrial applications. Polymerization of lactic acid to poly(lactic acid) was first studied about 50 years ago and continues to be a topic of research today.

Workers at Battelle, Columbus, Ohio have done considerable research and development of lactic acid based polymers during the last two decades and project the potential of multihundred million pound markets in commodity plastics and controlled release agrochemical formulations. In such applications the environmentally benign poly(lactic acid) or copolymers with glycolic acid or caprolactone would biodegrade in the environment to natural products. The wide range of physical properties achievable on processing these copolymers of various compositions confirms the excellent potential for their use in place of many of the current commercial thermoplastics.

While properties of the polymers are excellent, full realization of their potential will depend on improved preparation and recovery of the basic fermentation chemicals. Improved biotechnology that leads to higher solids fermentation to produce lactic acid in pure state is needed. Enhanced recovery technology is required to readily recover lactic acid from the fermentation broth. Direct fermentation of starch rather than conversion first to glucose has been reported and could assist in improving the economics of lactic acid production.

Although fermentation of sugars to produce polyhydroxybutyrate (PHB) has been known for decades, several shortcomings of the polymer have prevented its use on a significant commercial scale. Copolymers of hydroxybutyrate with hydroxyvalerate (PHBV) overcome many of these shortcomings and such copolymers are now in commercial use. The bacterium *Alcaligenes eutrophus* ferments sugars to PHBV. The British Company ICI has developed a range of PHBVs with up to 30% hydroxyvalerate (HV). Whereas PHB is a rather brittle polymer, PHBV, with 25% hydroxyvalerate is quite flexible. ICI now offers PHB and PHBVs with up to 25% HV for a variety of applications. A 1988 product bulletin of ICI Americas Inc. lists several applications for PHBVs with varying HV content in such areas as medical implants, injection molding, extrusion/injection blow molding for packaging materials, and slow release delivery of medicinals.

The biodegradability of PHB and PHBV polymers has drawn attention to these natural polymers as interest in replacements for nonbiodegradable plastics has grown. The polymers, which have good shelf stability, undergo microbial degradation when buried in soil. ICI has announced that its Biopol (PHBV) is now being used in Europe in blow molded shampoo bottles, and ICI is actively seeking other markets for its biodegradable polymers. The price of the polymers is expected to drop from the initial \$15 per pound to around \$2 to \$4 per pound by the mid-1990s.

## Polymeric Starch in Plastics

Although plastic shopping bags containing low levels (6-10%) of starch were introduced in the United Kingdom in the mid-seventies, and researchers in the U.S. were reporting on starch-based plastic films and molded articles also in the mid-seventies, it is only within the last 4 years that polyethylene bags containing starch have been produced in the U.S. The St. Lawrence Starch Company, Limited, of Canada markets specially treated cornstarch as an additive for making starch-containing plastic films and bottles. Their product, granular cornstarch treated with a silane coupling agent and dried to less than 1% moisture, currently is being used by a number of polyethylene film producers to manufacture starch-containing plastic bags and bottles.

Employing a somewhat different technology, the Archer Daniels Midland Company has announced its entry into a new business which uses granular starch alone or in combinations with other components to cause plastics to degrade. This company started marketing their product(s) in 1988 and now enjoys a growing market for their product called Polyclean, in leaf compost bags, produce bags, diaper liners, blowmolded bottles and numerous other uses. Some of the plastics employ up to 20% of the specially treated starch.

Considerable work has been reported where starch is gelatinized and thus forms a continuous phase with the synthetic polymer rather than merely being present as a particulate filler. Starch-poly(vinyl alcohol) films are representative of such a continuous phase system and are used commercially to produce a water-soluble laundry bag for use by hospitals to store soiled or contaminated clothing prior to washing. The bag and its contents are placed directly into the washing machine, where the bag dissolves. To provide enhanced solubility a slightly derivatized starch is used for this application. Such water-soluble bags are also being suggested for packaging agricultural chemical pesticides to improve safety during handling.

Researchers at the Northern Regional Research Center (NRRC) prepared films from various combinations of starch and poly(ethylene-co-acrylic acid) (EAA) that have potential application in biodegradable mulch, packaging, and other products. Films containing 30, 40, 50, 70, and 90% starch were exposed to outdoor soil contact, with the ends buried in the soil, to observe their resistance to sunlight, rain, and soil microorganisms. Films with more than 40% starch deteriorated within 7 days, but those containing 30 to 40% starch remained flexible and provided mulch protection for at least 70 days. Other tests revealed that starch-EAA films have sufficient strength, flexibility, water resistance, and heat sealability for a variety of mulch and packaging applications.



In further research on blending starch with synthetic polymers, the NRRC workers developed a semi-dry process to extrude thermoplastic starch-EAA mixtures containing up to 60% starch and 2-10% moisture (3.3-18.3% on a starch basis at the 60% starch level). Films were blown at a die temperature of 125-145°C to produce films with good properties. Alternatively, ammonium hydroxide-urea solution was used to destructure the starch granules, and films prepared in this manner were blown on a commercial film blowing apparatus. Low density polyethylene (LDPE) was incorporated as a partial replacement for EAA, which further reduced film cost and in some instances improved properties. This patented technology has been licensed to Agri-Tech Industries, Inc. and is in early stages of commercial development.

Press releases from the Ferruzzi Group in Italy and Warner-Lambert in the USA and Europe forecast the production of plastics composed of 40-100% starch. The Ferruzzi Group reports preparation of films, pots, bowls, and plates containing more than 50% destructured starch. Synthetic low molecular weight hydrophilic polymers in the formulation contribute fluidity and rheological behavior similar to that of LDPE. These materials reportedly biodegrade under anaerobic and aerobic conditions. Starch decomposes quickly while the synthetic additives degrade more slowly. The films possess excellent printability, high resistance to oil and organic solvents, good gas barrier properties, and natural antistatic properties.

Warner-Lambert Company has been assigned a number of patents which describe injection molding of starch at 5-30% moisture with a large number of materials known to have compatibility with starch or to modify its physical properties. These patents are based on reports which describe the plastic behavior of high solids starch and gelatin gels. The reports point out that higher temperatures and pressures enable plasticization of starch with lower water levels than are required for production of gels and pastes at 100°C and one atm. Complete destructure of starch granules is accomplished under pressure at temperatures of 80-240°C in an extruder barrel and produces extremely thick pastes. The pastes become solid on cooling, as in an injection mold. As yet, little has been released about the physical properties of the products, but they are likely to depend greatly on the particular co-plasticizers and polymeric additives present in the formulations. Product examples in the patents are often capsules.

An expanded packaging material suitable as a biodegradable replacement for styrofoam has been described by National Starch and Chemical Corporation. Hydroxypropyl cornstarch with at least 45% amylose content (70% amylose, 10% hydroxypropyl preferred) and containing 21% or less water is extruded at a temperature of 150-250°C to produce an open cell foam with resilience and compressibility values similar to styrofoam.



Another approach to starch-plastics compositions is to chemically bond the synthetic polymer to starch through graft polymerization. Basically, the procedure used for synthesizing starch graft polymer is to initiate a free radical on the starch backbone and then allow the radical to react with polymerizable vinyl or acrylic monomers. A number of free-radical initiating methods have been used to prepare graft copolymers, and these may be divided into two broad categories: initiation chemically and by irradiation. The choice depends in part on the particular monomer or combination of monomers to be polymerized. Both chemical and irradiation initiating systems have been employed to graft polymerize onto starch a wide variety of monomers, both alone and in selected combinations.

Starch graft copolymers having thermoplastic grafted branches, e.g., poly(methyl acrylate) (PMA) or polystyrene, are an important group of polymers that have potential for commercialization. Starch-g-PMA is prepared by ceric-initiated graft polymerization of methyl acrylate onto either granular or gelatinized starch. The resulting graft copolymer typically contains about 50-60% PMA and conversion of monomer to polymer approaches 95%. These polymers can be extruded or injection molded into a variety of shapes. Extruded materials are strong and flexible and show promise in a number of applications. This technology, developed by researchers at NRRC, has been patented and recently licensed for commercial development.

#### Hydrophilic Starch Graft Polymers

Several other monomers have been graft polymerized onto starch, and several of the graft polymers show promise as thickeners for aqueous systems, flocculants, clarification aids for wastewaters, retention aids in paper-making, and many other uses. The polymer that has received the most attention and is now being produced by three U.S. companies is made by graft polymerizing acrylonitrile onto starch and subjecting the resulting starch graft-polyacrylonitrile copolymer to alkaline saponification to convert the nitrile functionalities to a mixture of carboxamide and alkali metal carboxylate groups. Removing the water from this polymer provides a solid that absorbs many hundreds of times its weight of water but does not dissolve.

Aqueous dispersions of saponified gelatinized starch graft-polyacrylonitrile can be cast to yield films on drying. These films are brittle but can be plasticized to improve flexibility. Flexible films can be obtained on casting aqueous dispersions of the graft polymer containing an anionic or nonionic latex.

Other forms of the absorbent polymer are obtained by alternate methods of drying. Alcohol precipitation yields a granular or powdery product,

whereas drum-drying affords flakes and freeze-drying gives spongy mats. Selected end-use applications dictate the most desirable form of the product.

For application as an additive to absorbent soft goods such as disposable diapers, incontinent pads, bandages, hospital bed pads, and catamenials, interest has been expressed in the powder, film, and mat forms; the first two forms have been used commercially in disposable diapers, incontinent pads and hospital bed pads. The ability of the absorbent polymer to retain most of its absorbed fluid under pressure is a desirable property for such applications.

Partial hydration of the starch-graft polymer provides a hydrogel especially effective in treating skin wounds of animals. The hydrogel absorbs large quantities of fluids secreted by the wounds, provides relief from pain, and prevents drying of subcutaneous tissue. Clinical trials with the hydrogel conducted with human patients suffering from decubitus ulcers or stasis ulcers gave excellent results. All skin ulcers responded favorably to the treatment, and the wounds either healed completely or developed a cleaner bed of granulation tissue. In every case, the hydrogel dressing resulted in less eschar formation, fewer infections, and less odor than ulcers treated by other methods. In early 1981, a medical supply company began marketing the product for use by humans.

Agricultural applications, such as for seed and root coating and as an additive to fast-draining soils to retain water, appear most promising. Large-scale field trials with corn, soybean, and cotton seed coated with the polymer have shown increased germination and seedling emergency and, in most trials, increased yield. The dipping of bare-rooted seedlings in hydrated polymer before transplanting overcomes transplant shock and greatly increases survival. For such applications, the powder or granular form is being used.

The polymer has been used for several years as an agent to remove water from diesel fuel. One company incorporates the polymer into the fuel filter whereas another company provides the polymer in a "sock" to be placed in the fuel tank.

#### Starch Encapsulated Pesticides

It has been estimated that we lose nearly 20 billion dollars in agricultural production each year in the U.S. due to pests. This remains so even though we employ the best pesticide technology available. Our best technology needs to be improved, and there is considerable research effort directed to better pest control technology including improved formulations, more efficacious pesticides, and more environmentally acceptable control agents.

Technology has been developed for using starch to entrap or encapsulate a broad range of pesticides, both chemical and biological. For chemical herbicides and insecticides, the starch formulations improve the efficacy of pest control by keeping the pesticide targeted to the pest. Losses of chemicals that normally occur through volatilization, decomposition by sunlight, and leaching by water are greatly reduced when applied as starch formulations. For biological pesticides such as *Bacillus thuringiensis* (Bt) the starch matrix protects the pesticide from environmental degradation and prolongs activity in the field.

Starch as a matrix-forming polymer effectively encapsulates liquids or solids to provide granules or films in which the active agent is entrapped within tiny cells. When applied to soil or foliage, the formulation provides controlled release of the pesticide to the target pest. By controlling release, less pesticide often can be used, and the amount lost to evaporation or leaching is greatly reduced or eliminated.

Increased concern about groundwater contamination due to pesticide leaching has heightened awareness to the need for improved pesticide formulations. In laboratory soil column study, starch-encapsulated herbicides showed much less leaching through the column than standard commercial formulations. Based on these results, multihundred pounds of starch encapsulated alachlor, metolachlor and atrazine were prepared and placed under field evaluation in several states in 1990. Commercial formulations also were applied for comparison of weed control, corn yield and movement of active agent in the soil. Soil cores have been removed throughout the crop year and will be analyzed late this year.

Preparation of the multihundred pound quantities was done under contract based on a continuous extruder process for performing the encapsulation developed by NRRC scientists. A patent application disclosing this process was filed in June 1990, and several companies have expressed interest in obtaining a license to the technology. Currently, we are cooperating with several companies to demonstrate the benefit this technology can bring to their pesticides.

Bt has been marketed for several years as a biocontrol agent for certain insects. Although quite effective for a short duration, exposure to elements of the environment, especially ultraviolet (UV) rays of sunlight, readily reduces Bt viability. Formulating the Bt in a starch matrix where one can also include a feeding stimulant and a UV screen, significantly enhances the effectiveness for control of neonate European corn borer larvae. Both granular and sprayable formulations have been prepared and evaluated in the field. This technology has been further advanced through a Cooperative Research and Development Agreement where broader scale field trials were conducted. Commercialization appears imminent as the patented technology is now being exploited under an exclusive license agreement.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture

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## DIVERSIFICATION OF THE AGRICULTURAL PRODUCT PORTFOLIO THROUGH BIOTECHNOLOGY

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United States agriculture has demonstrated a remarkable capacity to cope with economic set-back. Yet there is, increasingly, a need to buttress U.S. competitive strength globally in agriculture. During the past decade, a downturn of the world economy, coupled with an adverse rate of dollar exchange, has led to surpluses in agricultural commodities. Technology gathering activity vigorously pursued by various nations, has enabled them to enhance farm productivity. Moreover, many of these countries are stridently building up research and development programs in agriculture. It is not surprising, therefore, that the competitive position of the U.S. in global agriculture is being challenged more and more.

A key to greater competitiveness lies in a novel, diversified and expanded agricultural product portfolio. The technological know-how that characteristically emanates from U.S. institutions, such as the USDA - Agricultural Research Service, can be turned into world-beating products.

It is regrettable that more than one-half of U.S. agricultural exports tends to be unprocessed commodities. The food processing industry appears to be focussed on the domestic market rather than take on the challenge of developing export markets. Few of the food processing industries have export markets greater than a billion dollars. Processed food imports to the U.S. are at least 50% greater than exports. In fact it was in the early 1980's that the U.S. became a net importer of processed agricultural products.

To provide an attractive portfolio of products to consumers worldwide implies the use of ingenuity to add value to commodities. The rich, renewable resource of U.S. agriculture must be exploited in this way. By adding value domestically, as an alternative to selling commodities for a few cents per pound, creates jobs and investment capital.



It is instructive to pause and to consider the prodigious increments in value that have been made to non-renewables, particularly metals and plastics. From conventional steel bridges and cargo ships to automobiles, television sets, semiconductors, computers, video cameras, commercial jet planes, aero engines and fighter jets to space satellites, comprises successive leaps in added value at rates of tens, hundreds and thousands of dollars per pound. This dramatic enhancement of value of course owes much to the recent micro-electronic and computer revolution. Agriculture must exploit that other great technological revolution of this century, namely, biotechnology. Advances in biotechnology, an admirable collection of techniques, chiefly molecular genetic and biochemical engineering, are unlocking a steady build-up of value-added possibilities for agriculture.

Tempting markets exist for biotechnology-based novel products. For example, the world market for farm chemicals exceeds \$30 billion/year: suitably engineered biological control products (e.g., biopesticide and plant growth regulators) are targets, as well as the bioprocesses that have to be designed and developed for their manufacture. The seeds market is about \$25 billion with scope for plants engineered to provide agronomic traits of commercial significance (e.g., disease resistance). Veterinary product sales exceed \$8 billion; consumer demand for natural, bioveterinary type products is becoming significant.

ARS product development and advanced manufacturing strategy is based on the thesis that the process of growing crops and chiefly exporting the raw commodities, which then are converted into value added products and frequently sold back to the U.S., has severe limitations as a business enterprise. Rather, consumer needs must be identified and then filled through novel and improved U.S. higher value products both in the food and nonfood product classes.

## **FOOD PRODUCTS**

As a consequence of shifts in consumer preferences, dramatic changes have been taking place in the food products industry. Demands for health, convenience, novelty and luxury are propelling the industry toward new opportunities. Food companies of the future aspiring to greater competitiveness will be those who can offer unique products. Correct interpretation of the moods and driving forces of the marketplace will be an essential ingredient of business strategy.

One's attitude to life can create a bias toward certain patterns of food consumption. People are expecting to live a long time. It has not escaped gerontologists that the 90-plus year old person of the future probably will have the vigour and attitudes of 55 year old people today. Coupled with exercise, low-calorie diets focussed on protein, vitamins and minerals are being sought. The fare will not be totally spartan. As rewards for moderation the diets will be punctuated with rich gourmet type foods.

Increasing demands for freshness, nutrition and "natural" ingredients are being heard. ARS research is responding with a menu of research projects which will create technology to meet these emerging consumer patterns. Some examples are:

- a) Use of biotechnology to develop food microorganisms for producing natural flavors, colors, preservatives and texturizers.
- b) Development of fat substitutes.
- c) Design of functional foods giving added protection against disease, e.g., components that stimulate the immune system.
- d) Increased shelf-life: use of genetic engineering technology (e.g., anti-sense technology) to inhibit enzymes involved in the senescence of fruits/vegetables.
- e) Experiments in novel packaging, e.g., the development of edible films.
- f) Elimination of processing generated contaminants in foods, e.g., nitrosamines.
- g) Inhibition of enzymes in fruit juices which destroy pectin and fruit juice "body."
- h) Lactose fermentation to omega-3 fatty acids.
- i) Frozen doughs for exports.
- j) Use of advanced chemical engineering unit operations design and process control for improved food processing systems.
- k) Bioprocessing to produce more conveniently preparable foods.
- l) New processed food products suited to foreign consumers' needs.
- m) Upgrading of processing wastes.

#### **NONFOOD INDUSTRIAL PRODUCTS**

Agricultural commodities such as cereal starches, vegetable oils and dairy materials provide an attractive potential source of industrial products. Possibilities exist over the whole range of products from biopharmaceuticals, chemical specialties to fine and bulk chemicals. Some product classes deserve more attention than others, chiefly because of market factors.

A plot of unit prices against market volume tends very roughly to a negative exponential curve. The product class chosen by ARS for research focus is based on product price-range, potential market volume and a projected time-frame for technology development.

At the low-margin, large volume end of the product spectrum are bulk fermentation chemicals. Already processes exist for the manufacture of many of these chemicals; there could be scope for lowering costs of production. Also, vast uses for commodities would be implicated. Alternative manufacturing sources, however, (e.g., petrochemical) are very competitive at present. Such low-price bulk chemicals are therefore less emphasized; this could change as petroleum prices soar. The very high-priced market-end such as biopharmaceutical products absorbs only small quantities of major agricultural commodities for their manufacture. Nevertheless, for reasons such as environmentally benign operations, there is a need to develop suitable bioprocess technology; for example, as an alternative to using trees for extraction of biomedical products, develop a plant cell bioreactor system.

The medium priced (\$1.50 - \$15.00/lb) category of chemical specialties offers a set of attractive possibilities. Numerous specialty market niches can be filled. Moreover, each product results in an appreciable use of agricultural commodities; all of these uses add up to creating new multi-billion pound markets for U.S. cereal starch, soybean oil and dairy materials. This category of chemical specialty and fine chemical products has been chosen as a principal focus for ARS industrial product development strategy.

Some research thrusts of high priority are:

- a) Develop fermentation processes for producing natural, biosafe pesticides as alternatives or adjuncts to chemical pesticides; starch is used as a fermentation substrate. Biopesticides are expected eventually to form substitutes for a substantial portion of the \$16 billion pesticide market worldwide.
- b) Conversion of cereal starch (corn/wheat) to biodegradable plastic films such as trash-can liners, grocery bags, food packagings) as well as injection-molded articles such as beverage bottles.
- c) Encapsulation of chemical pesticides with starch suitably formulated. This permits lower application rates of pesticides and reduces groundwater contamination.
- d) Development of novel biomaterials such as hybrid block copolymers from polysaccharides, lipids and proteins found in various agricultural commodities.
- e) Manufacture of biosurfactants and biopolymers to fill a variety of market niches.
- f) Conversion of soybean oil to specialty chemicals as substitutes for imported chemicals; both biotechnological and chemical catalytic systems are being exploited.

- g) Development of a bioreactor system for the production of natural rubber; this involves genetic engineering work on rubber synthesizing enzymes. This project is of considerable strategic importance for the U.S.
- h. Develop plant-cell bioreactor systems for manufacturing anti-cancer drugs and other biopharmaceuticals.
- i) Evaluation of the potential of novel crops as sources of industrial products.

#### **TECHNOLOGY TRANSFER**

Success in accelerating the flux of technology from the initial research step through development to the marketplace depends crucially on the mode of technology transfer. ARS has structured a system directed by the Office of Cooperative Interaction. This permits cooperative research and development agreements (CRADA) with industry. An industrial partner is selected by judging the thrust and quality of the business plan. Exclusive rights to the technology can be granted.

During 1989, sixty-one inventions of 140 reported were filed. Already by July 1990, 148 inventions were reported and 68 of these were filed. ARS technology is being licensed in by industry and research scientists are being awarded a share of royalties.

The flow of research products toward commercialization is vibrant; ARS is indeed playing its part in assuring that the United States remains thunderingly competitive in agriculture.



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
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Outlook '91, Session P1

Tuesday, November 27, 1990

## Agriculture in a World of Change\*

Clayton Yeutter  
Secretary of Agriculture

It's a delight to have you here for the Outlook Conference. It's become a best-seller event through the years and justifiably so. We're pleased to have everybody involved and pleased to see so many others participating indirectly through television and radio around the world. The subject of this year's conference, as you know, is "Agriculture in a World of Change," and Bruce just handed me one illustration of that -- which I'll share with you right now.

One of the things we're going to do today is release the new Yearbook of Agriculture, and here it is so you'll be able to see that shortly. This one is called "Americans in Agriculture: Portraits of Diversity." It's a human interest edition of the Yearbook -- something a little different from what we've ever done before. We think you'll like it because it focuses on some of the personalities of American agriculture in a very real and sometimes potent way. So I'm officially announcing the availability of this year's Yearbook of Agriculture.

Now as to the subject at hand: the world of change in agriculture. Let's focus on that, because there's a lot to say, and we've only got a half-hour to do it before we go into questions. A lot of things have happened as agriculture has evolved in this world of change over the years. This is the 67th Outlook Conference. If one just goes back a half a century you'll remember the 1930's when farm programs really began in this country. The Soil Conservation Service and the Rural Electrification Administration were formed and, in the 1950's, tractors surpassed horses in numbers for the first time in this country. That's not really very long ago. And that illustrates how sophisticated agriculture has become over the last 40 years.

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\*Based on a transcript

In the 1960's, agricultural programs took a new twist with the evolution of the Food Stamp Program, the very active expansion of the School Lunch Program and the expansion of the program of special assistance for women, infants and children, or WIC. That was a totally new arena and as you know, those programs now account for about half of the Department of Agriculture budget.

In the 1970's we had our first export boom. This was the first time that the global dimensions of American agriculture really came to the fore. And then in the 1980's, we felt some of the impact of macroeconomic factors outside our control. We experienced a great deal of turmoil, disillusionment, and the loss of a lot of farmers in the early to mid-1980's, followed by a recovery period. As we completed that decade and went on into the 1990's, the situation changed greatly for the better.

That doesn't mean that we're free of problems in American agriculture. There are certainly strains in the system domestically and internationally, but the overall economic health of this industry has infinitely improved over what it was 5 years ago.

From a productivity standpoint, it is obvious that we continue to do well. I sometimes wonder why it is that we do have some in American agriculture who are fearful of international competition. In my judgment we have little to fear in that arena from anyone, because we've done so well on the productivity front and continue to do so.

Just look at what has happened in 1990. We had about an 8-billion-bushel corn crop, and a nearly 3-billion-bushel wheat crop, even though we had some 30 million acres of land in a conservation reserve and that much in set-asides. That simply indicates the enormous productivity and the tremendous potential we have for international competitiveness in American agriculture, and we should all recognize that and be grateful for it. That's not a curse. That's a blessing and we ought to thank our lucky stars that we have people who are committed to research, education, and technology, as well as good education in our local school systems, enabling us to build American agriculture into a plant that is the envy of the world.

The message, of course, of all that productivity performance is that we must find markets for the products that emerge in that scenario. That will be the challenge of the 1990's, and it's the challenge that appeals to me most. I've had some personal criticism. The Department and the Administration have had some criticism for not providing more Federal subsidies to American agriculture.

As you know, the budget reconciliation process has resulted in

reductions in those subsidies from what's been programmed for the next 5 years. But the fact is we ought to look on that as a blessing rather than as a curse. We need to provide for a healthy American agriculture based upon the international marketplace and the creation of demand, not upon massive Federal subsidies for which we have to come to Washington, DC, as farmers and get down on bended knees to solicit the financial support of the U.S. Congress. That's not a healthy situation. That's not one that sits well with farmers who have had an independent spirit for 200-plus years.

I think the farmers of this Nation will be much more comfortable and much more satisfied if we can develop their income opportunities from the domestic or international marketplace. I'll comment more on that in just a minute.

Regrettably, recent events have reduced prices for some of our farm commodities, and that is a troublesome psychological experience for everyone. We understand that. Everyone likes to see markets going up rather than going down. However, the fact is they go in both directions. Depending upon supply and demand characteristics, we're inevitably going to have some periods in which prices decline.

This year prices are declining in a number of areas because there are gigantic crops everywhere. Now it's easy to attribute those to the Secretary of Agriculture, but the fact is the Secretary of Agriculture does not control the weather. I didn't have anything to do with the tremendous productivity that we've seen in countries throughout the world or the immense supplies that are now available.

This is a huge shift from the situation that prevailed only a year or so ago, when we were worried about being able to retain carryover supplies at sensible levels. The world can change very rapidly. It did so this year through very large increases in production. Of course the price situation was also affected by the embargo against Iraq and also by the absence of the Soviet Union from the market -- an absence due primarily to the Soviets' own economic problems. But we'll overcome all these things over time. We have to recognize that there are no immediate 24-hour solutions, and that we need to deal with these questions systematically and methodically. I'd like to comment now on those questions.

First of all, I will comment on what, if anything, we can do about these challenges in the short run and then, second, what, if anything, we can do about some of these challenges in the long run.

In the short run, of course, we have some tools that are



available to us under the 1985 Farm Bill and carried through into the 1990 Farm Bill, which will soon become operative.

We expect the President to sign that legislation tomorrow -- but under existing legislation we can do things with our Export Enhancement Program (EEP). We're attempting to use that as vigorously and as aggressively as we can, but there are some limitations as to how much product we can move through the EEP because that still requires the decision on the part of the buyers as to whether to participate.

We cannot force people to accept whatever proposals we make under the EEP. We have a lot of proposals out. For all practical purposes, we have EEP's out everywhere now on essentially everything that's in surplus to about everybody who's a potential buyer anywhere in the world. We intend to continue to do that, but it's a highly competitive situation where a lot of other countries also are attempting desperately to move surplus production into the world market. That's not likely to change in the immediate future.

We will very likely exhaust our EEP budget in a relatively short period of time this fiscal year. That will, of course, require a reappraisal of the budget situation in discussions with Congress at a relatively early date. It is because of the immense crops and the tremendous competition that exist in the world today that we're having to use bonuses in the EEP that are far, far larger than we've used in a long time.

With respect to Public Law 480, clearly we can do some things there and we will do so. I was rather amazed that the market declined yesterday when I made some statements to the effect that the Soviet Union had not asked for food aid. I find that hard to rationalize, because we will be using the entire Public Law 480 budget without regard to whether that aid will go to the Soviet Union or some mix of developing countries. There are ample customers for P.L. 480 and that full budget will be exhausted, as it should be. So it's ridiculous to have a market reaction based upon the fact that some of that aid may go somewhere other than the Soviet Union.

With respect to export credits, there's a considerable discussion on that subject at the moment. The discussion relates primarily to the situation in the Soviet Union and the United States' insistence that the Soviets deal with their immigration problem before export credit guarantees are made available. There's been a strong clamor from the American agricultural community for the Administration to adjust that position. Obviously, we'd love to have our share of the Soviet market. It's been a significant market to us and all we can do at this stage is encourage the Soviet Union to deal with the immigration issue in a satisfactory



fashion. We happen to think that's an important issue.

People in the United States believe that fellow human beings ought to be treated in a sensible way regardless of what country they live in. And we believe that the fundamental rights of human beings must be respected by all of us. In this case, we're standing up for some rights and privileges that merit the protection and attention of all of us who live on the face of this Earth.

Regrettably, that's costing us some sales at the moment because there are other countries that apparently feel less strongly about this issue than we do and are amenable to providing the guarantees to the Soviet Union that are being solicited. But we hope that situation changes in the future and that we'll see the Soviet Union participating with us in the marketplace as they have in the past.

I believe it somewhat ironic, too, that some folks (including Members of Congress) are quick now to condemn the Department of Agriculture for the use of credit guarantees in Iraq even though Iraq had an unblemished repayment record until Saddam Hussein's recent aggression in Kuwait, and even though Iraq had a great repayment capacity based upon its oil resources. Some of the people who in hindsight are criticizing our use of credit guarantees for agricultural sales to Iraq are the first to criticize us for not making comparable guarantees to the Soviet Union. That's not even considering the fact that the economic situation in the Soviet Union is something other than impressive at the moment, but we'll try to deal with the credit situation in a sensible way now and in the future.

We'll be making 1991 set-aside decisions based on the situation that prevails in the world market. A lot can happen between now and next spring, but certainly we'll carefully consider the supply-and-demand situation as we make those decisions in 1991. But we don't intend to unilaterally disarm. This Department made a mistake some years back in doing that -- in taking massive amounts of land out of production without any corresponding response on the part of some of our trading partners. We hope to avoid that situation in the future. If there has to be a response on the supply side, it will come from everybody and not just from the United States.

Let me now turn to the long run. You've all heard me talk about the Uruguay Round negotiations on many occasions. I don't want to take a lot of time on that this morning. We can cover some of this in questions, but I will reiterate that this is the true hope for the expansion of American agriculture and the generation of demand that is so essential if this great industry of ours is to be healthy in the 1990's and on into the next century.

What I've talked about thus far in the way of short-term measures -- whether we are discussing the EEP, credit guarantee programs, set-asides, or anything else -- are only immediate steps. They in no way respond to the overall challenges of developing the international marketplace. That has to be at the negotiating table -- either bilaterally, multilaterally, or both. There is no other way. If we relegate ourselves to simply supplying the domestic marketplace here in the United States, there is no way in the world that agriculture will be a growth industry over the next decade or two. We have no alternative to attempting to generate demand for American agriculture products in the marketplace.

Now the domestic marketplace should not be ignored in that regard. You've heard me talk about industrial uses of farm products -- in particular, the expansion of the use of ethanol or ethanol-based products. We ought to devote some attention to that. Assistant Secretary for Economics Bruce Gardner, who is here with us, is very much involved in that effort, as well as some other people in the Department and other people out here in this audience. That's important, but certainly the greater magnitude lies in the international sphere.

Now let's just use the Soviets' situation as a comparative example in this regard. Everyone in American agriculture seems to be devoting a lot of attention to the Soviet market at the moment and that's appropriate. It's a big market for us, and it can be a bigger market in the future if the Soviets generate economic growth (as we hope they will) when they put in their reforms, and as we help them in a variety of ways in accordance with our laws. But the fact is that what has happened in the last decade outside the Soviet Union has had a far greater impact on farm incomes here in the United States. We need to understand that, using the European Community's grain programs as an example. The shift in the Community from importer to exporter as a result of its own policies over the last decade or so has affected 50 million metric tons of grain. That goes way beyond anything that we talked about in the Soviet marketplace, and way beyond anything we talked about anywhere else in the world in a single product category.

A decade or so ago the European Community imported between 20 and 30 million tons of grain per year. Now the Community exports between 20 and 30 million tons of grain per year. That has not happened because the Community has become more competitive internationally or has been doing a better job than we do at managing farms. It's happened because of the distorted practices that have been followed in the farm policies of those countries. That's what needs to change. It's changes of that nature and of that magnitude in the European Community and elsewhere in the

world that will open up additional market opportunities for American agriculture in the future.

The principal mechanism for achieving reforms today is the Uruguay Round, an exercise that began 4 years ago, as you know, in Punta del Este, Uruguay, and an exercise that's scheduled to conclude in Brussels starting next Monday.

As many of you know, I was in Europe 2 weeks ago to assess the probabilities of reaching a successful conclusion on the agricultural negotiations of the Uruguay Round. I came back very pessimistic about the outlook and I'm still very pessimistic. It seems to me that the position of the European Community is so far from that of rest of the world that I see no way to bridge that gap in the few days that remain. The only country that is at all supportive of the overall position of the Community is Japan, because it wishes to protect its rice markets. It's a purely protectionist response based on rice alone. But with the exception of Japan, all of the rest of the world is willing to go much, much further down the road of agricultural trade reform than the Community is, and that's important. If we're to have a fair shot at the international marketplace over the next 20 years, we badly need these reforms. They're long overdue. They should have taken place a decade ago or two ago. We're way behind time. We're playing catch-up ball in this area. If the Uruguay Round fails in agriculture we're going to have a far worse situation over the next 10 years. All of us will pay a price for that. The Community will pay a much heavier price than it now realizes and we'll have to make major changes. Suffice it to say that it will require a very strong effort on the part of everyone if this negotiation is to have any chance at all of coming to a successful conclusion next week.

Let me just make sure that everybody understands the differences in the positions and the reason for my pessimism. I wish I could be more optimistic. As most of you all know, I'm a born optimist, and I certainly haven't given up on the Uruguay Round. I don't want to give up on the Uruguay Round, because it's too important to all of us.

Dick McCormack may have some comments about that in the context of the overall global situation. But the fact is there are four major areas of the agricultural negotiations, all of which are important to the United States.

One is the so-called phytosanitary code that deals with food safety and food standards issues. That's a very important area and the one about which we can be most optimistic. There is a reasonably good chance of bringing that negotiation to a successful conclusion next week with a code that will be helpful in this area. It won't solve all of the food safety problems of



the world, but it will certainly be a step in the right direction and will be helpful to many of the people in this room and to many of the people throughout the world.

The other three areas, though, are all interrelated in terms of foreign policies. One concerns what happens on internal supports -- the supports that generate the surpluses around the world. Two, what happens on market access -- opening up international competition throughout the world. Three, what happens to the disciplining of the export subsidies that so distort trading practices in the world.

With respect to internal supports, the Community position is a 30 percent reduction in internal supports over a 10-year timeframe based upon a 1986 calculation. When one brings that in into the real world, one discovers that about half of the reforms that have been proposed by the Community have already taken place, which means there's a commitment to only the other half. That is about a 15-percent additional reduction in internal supports between now and 1996, with no commitments thereafter.

The U.S. position is a 75-percent reduction in these supports over the next 10 years. The 1990 Farm Bill already provides most of what the United States needs to do in the discipline of internal supports over the next 5 years.

Now, with respect to market access, the Community has offered a 30-percent increase, but when one adds Community preference, rebalancing, an exchange rate adjuster, and a price rate adjuster as qualifiers to the offer on market access, essentially no additional market access is offered for anybody to the markets of Western Europe. If we cannot achieve additional market access in Western Europe, it would be exceedingly difficult, if not impossible, to convince other nations around the world to open up their markets more.

And, finally, in the area of the export subsidies, which we find most distasteful, there are no specific commitments by the Community at all. The Community spends more on that area than does the rest of the world combined. We're outspent in our Export Enhancement Program something like 20 to 1.

So those are the facts. When one compares our proposal and the proposal of the Cairns Group of countries -- which is in essence a proposed reduction of 75 percent on internal support, 75 percent on market access, and 90 on export subsidies over a period of 10 years -- with a commitment by the Community of about 15 percent over the next 5 years in internal supports and essentially nothing on market access or export subsidies, one can see how far apart we are.



Can we bridge that gap in the next week in Brussels? One certainly cannot be optimistic about the chances of doing so. That's regrettable, because in the absence of success on agriculture in Brussels -- particularly if it spills over into the other areas, as is almost assured -- the entire Uruguay Round would fail. The entire world would lose the benefits of what could have emerged from all 15 of those negotiating groups in terms of improved economic activity and the enhanced economic growth over the next 10 years.

U.S. Trade Representative Carla Hills estimates that a successful Uruguay Round would boost the world's economic productivity and output by \$4 trillion over the next 10 years. That's worth going after and that's a very high opportunity cost for failure after 4 years of effort. It would be tragic for the world as a whole and especially tragic for the United States, because a good chunk of that \$4 trillion of additional economic activity would take place here in the United States. It also would be tragic for American agriculture, because we would lose the opportunity for enhanced export sales that would inevitably result from a satisfactory agreement.

What will we do if the Uruguay Round does not reach a satisfactory conclusion? We'll have to reappraise our policy structure. We'll have to determine how best to protect our own interests. We'll have to determine how to get the most bang for the buck in a more confrontational environment in international trade in agriculture and perhaps international trade in all the other spheres of economic activity as well.

That's not a happy proposition and I certainly hope that it does not emerge. We're certainly going to go to Brussels next week with an open mind on all of this in an attempt to try to reach an outcome that would be in the interest of the entire world, and particularly in the interest of American agriculture. I know Ambassador Hills shares that view. I know Secretary McCormack and Secretary Baker and others at the State Department share that view as well. But this is not something the United States can do by itself. We're not going to negotiate with ourselves in Brussels next week. We're not going to come back with an agreement that we do not believe is in the best interest of this country. And I'm certainly not going to come back with an agreement that I do not believe is in the best interest of American agriculture. If we're going to rely on the international marketplace, which I believe is proper and which I believe most farmers in this country dramatically and enthusiastically support, we've got to try to open markets. If we can't do it in the Uruguay Round, we have got to find other ways to do it. But the Uruguay Round is certainly the preferred mechanism, and we'll do the best we can in Brussels next week.

Now I'd like to stop right there. I want to say to all of you how much I appreciate Secretary McCormack's coming over on about 24 hours notice. As Bruce Gardner indicated, Secretary Eagleberger had planned to come, but the President asked him to accompany him to Mexico for his meetings with President Salinas. That moved the duty to Dick McCormack's very able shoulders and, Dick, we genuinely appreciate your willingness to do this on short notice.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
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## FOREIGN POLICY IN A WORLD OF CHANGE\*

Richard McCormack

Under Secretary of State for Economic and Agricultural Affairs

Thank you very much, Clayton. I'm delighted to be here. Today I thought I would say a few words on three major topics which will have major consequences for global stability and prosperity:

- o the international trading system;
- o the rapid changes in eastern Europe; and
- o the challenge of maintaining a prosperous and competitive U.S. economy.

### I. The International Trading System

One of the main challenges we face as we look to the next decade is to make comparative advantage the centerpiece of the way international trade operates. Essentially, what this means is that if you produce something at a cheaper price than somebody else does, you ought to have the opportunity to sell that on world markets. To do this, we obviously have to do something to level the playing field in various aspects of international trade and we're trying to do this in a number of fora.

The Uruguay Round is the centerpiece of our current activity in this area, as Clayton mentioned. It's a very tough negotiation, and I wouldn't be any more courageous than he is in trying to predict what the outcome is going to be. It's exactly as he said. We're not in the business of going over to Brussels to negotiate with ourselves. We've said very clearly what the U.S. bottom line is, and we hope that we're going to get some more forthcoming attitudes in Brussels, but that remains to be seen.

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\*Based on a transcript

If we could make this round succeed, it obviously would be very significant. As Secretary Yeutter mentioned, there is a potential \$4 trillion increase in world economic output over the course of the next 10 years if we can make this thing come together. However, it takes a tremendous effort because of the obstacles to liberalizing trade in every sector and in every country.

It's a major challenge for us and we can't ignore that challenge. And the reason we can't ignore that challenge is that we've got a very significant trade deficit which currently is over \$100 billion a year. That just can't go on forever. In the early part of the coming decade, we're going to have to import 80 percent of our oil, not just 50 percent as we currently do. That means we're going to have to export more goods and services to pay for the oil and other imports that we badly need.

To do this we have to open markets. We've got to get that level playing field that we've all been talking about and that we need to see happen in this area. So we're pushing hard in the Uruguay Round.

We've also working in a number of other areas that you know about. We're discussing with a number of countries the possibility of establishing free trade agreements, and we've successfully achieved two: one with Israel and one with Canada.

We're anxious to make sure that these free trade agreements conform to the global trading system. That's why we're making sure that the Canadian agreement, the Israeli agreement, and a potential Mexican agreement are what we call GATT-compatible.

We want to avoid the danger that Margaret Thatcher warned about this past summer: the fragmentation of the world into trading blocs. I'm talking about the kind of world where we build a dollar-based trading bloc in the western hemisphere, the Japanese build a yen-based trading bloc in the Pacific area, and the Europeans build one in Western Europe centered around the Common Market.

That would be a catastrophe, because most trade does not flow north and south, or vice versa; it flows east and west. If we start interrupting that flow and creating blocs, economies all over the world will be totally disrupted. Nobody needs that.

We're also trying to use these free trade discussions to persuade other countries such as Mexico to make their economies more efficient. Prosperous neighbors are good customers. Poor neighbors are not-so-good customers. So what we're doing in discussions with the Mexicans and others is trying to get them to open up their investments, open up their markets, and do other



things that would make their economies more efficient. These things would create more prosperity and, ultimately, more customers for our exports. That's terribly important to us. We have a big stake in succeeding with Mexico.

## II. Eastern Europe

I have just a few observations with regard to eastern Europe and the Soviet Union. As you all know, the euphoria of the liberation is over; now comes the hard part of trying to create something new out of a system which essentially has collapsed. It isn't easy. We always knew it was going to be harder, longer, and tougher than some people had expected. It is not easy to create a totally different system.

In the cases of Czechoslovakia, Hungary, and Germany, we are relatively optimistic. They're beginning to move in the right direction. Poland is moving in the right direction, but there are just immense tasks to be accomplished. The problem is even greater for the Soviet Union.

The eastern European countries may have it a little easier because in those countries there are still some people who remember what it was like to operate under a market economy. However, the Soviet Union has been under communism since 1917; there is no living memory of what a market system was like once upon a time. They have to construct everything from scratch, learn the most basic things, create the most basic market-oriented infrastructure of wholesalers and retailers. It's a gigantic undertaking.

As you know, the Soviet Union was once a major agricultural exporter, just as eastern Europe was at one point. Along came communism and the inefficiencies that inevitably flow from that system. Instead of remaining exporters, these countries became net importers. Unfortunately, from their perspectives, the situation seems unlikely to change in the near term.

The Soviet Union has many problems and many challenges. As you know, the country's currency, the ruble, can't be converted to other currencies. That means you can't change the ruble for a dollar and buy something from abroad. The problem now is, because the Soviets have printed so many rubles at home, that those rubles are not even as useful to Soviet citizens as they once were in buying things at home. Consequently, not only has international trade been reduced to a barter status, but many elements of the Soviets' domestic economy are now being reduced to a barter basis where collective farms are trading with factories for the basic goods that they need.

You cannot run an economy that is the size of the Soviet Union's on that basis. It is imperative for them to get some sort of system that will enable the economy to function on the basis of price and currency.

That is a major challenge. Beyond that, however, there is a serious discussion over who owns what in the Soviet Union. Who owns the oil? Do the Russians own it? Does the Soviet government own it? Those uncertainties make it difficult for credit arrangements and other kinds of things to flow.

Now, their problems are not without solutions. There were no solutions in the old system. There is a potential for a solution in their current system if they work the bugs out. They need to stop printing rubles and devalue their currency to the point that it has some meaning both at home and abroad. If they do these things, the future could be promising, but the problem is going to be transitional difficulties which we fear will last for a significant period.

In the short term, the Soviet Union will continue to require large quantities of foodstuffs from abroad. In the long term, if the Soviets get their system organized, theirs could become a food exporting country, as it was before 1917. However, that looks to us to be a very, very long way down the pike.

### III. Maintaining a Prosperous and Competitive U.S. Economy

In our own country, our basic challenge is to maintain and expand prosperity for all our people in an increasingly international economy. We can no longer take for granted that U.S. technological superiority will happen as a matter of course. Other countries have laboratories and are spending immense amounts of money on research and development.

Technological superiority is something that has to be won every single decade. It is imperative that the United States increase the amount of money spent on research and development and that individual firms increase significantly the amount of money that they're spending on research and development.

This is something that boards of directors across the Nation must spend more time in dealing with. There's a tremendous orientation toward short-term profit. If short-term profit requirements crowd out long-term investment in research and development, we will devour the seed corn that is needed for future crops.

Another problem is that we're not creating enough young scientists and engineers in America. We've got to improve the

quality of education in high schools, because it is these people who are going to be creating the products necessary for us to sell not only in our own market but around the world in years to come.

Beyond research and development we have another challenge. We used to be fast in getting a research product turned into a commercial product and getting it out onto the market. Today, we're too slow; other countries take our research and turn it into products and sell them more quickly than we do.

This problem can't be solved by the U.S. Government. It is a challenge faced by individual firms throughout the United States. We've got to speed up the development of products from the laboratory to the supermarket, from the laboratory to the shopping centers.

We have another challenge in getting our interest rates down, but there's no magic formula. You can play the games that were played in the 1970's and print a lot of money and drive short-term interest rates down only to have long-term interest rates shoot up when the rate of inflation begins to rise.

The challenge we have at this particular point is to reduce the demands of credit, particularly by the Federal government, so that interest rates can drop and more money at lower interest rates is available to the private sector. That means we need to make continued progress on reducing our budget deficit.

As I look to the future, I see a number of challenges at home and abroad. The international problem involves making sure that we have an environment conducive to peace and prosperity. That means fair and open markets. At the same time we may need to make continued efforts to increase our competitiveness. It's clear to me that more U.S. resources -- both public and private -- are going to have to be devoted to maintaining our position in the world.

Despite the gloom and doom that you've seen in a number of U.S. news magazines recently about the current economic outlook, there's not the slightest reason for the United States to feel pessimistic about its medium-term prospects. After a gigantic 40-year effort, we have ended our global confrontation with the other nuclear superpower, and U.S. values -- freedom and free markets -- have absolutely triumphed. The lower military threat will enable us to shift some of our resources from the military area into improving our competitiveness and our economic prospects. That's going to happen.



Over the past 20 years, the U.S. economy nearly doubled in size in constant dollars. During the last 10 years we created 18.5 million new civilian jobs. Our real living standard is second to none.

In years past when we were faced with a challenge -- whether it was Pearl Harbor or Sputnik -- our society proved that it could rise to the challenge. Our problems today are modest compared with those earlier challenges. Now we simply need to make some incremental changes to consolidate and expand upon what we have already achieved. We need to make sure that we continue to have people like Clayton Yeutter around advancing our trade interests so that we can have a more level playing field in international trade.

There is one wild card in the deck. We simply cannot withdraw from the world and pretend it doesn't exist. All we have to do to guarantee trouble abroad is to a new period of isolationism. Our problems then will then once again resurface in very serious dimensions.

You saw what happened recently in Kuwait. Kuwait was a very tempting target. Nobody was there with a military force on the border. In came a local aggressor and suddenly one of the most important sources of oil in the world fell into unfriendly hands. Most unfriendly hands would have reached across the border to Saudi Arabia had we not moved immediately.

During the 1930's we learned what happened when America turns inward and leaves a power vacuum. The whole history of the last thousand years has shown what happens when a power vacuum exists. There is absolutely no substitute for the United States in the world out there if we want to have a stable, peaceful and prosperous world.

There is no doubt in my mind that with the end of the Cold War there will be increased debate here at home about pulling back and letting people take care of their own problems. If we do that, we guarantee that the prosperity and stability now within our grasp will come apart. Once again we will be forced at great cost and great expense to move back out into the world.

The alternative is to modernize international collective security arrangements, maintain our involvement in the world, keep our trading arrangements global rather than regional, and make sure that what we have achieved over the 40 years does unravel.

I am very optimistic, but what I think that matters less than what you think, because ultimately this is going to be decided in the great American democracy. And my hope that when this debate



occurs and begins to intensify -- as it inevitably will over the next few years -- you'll speak up and support an involved America.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
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Outlook '91, Session P1

Tuesday, November 29, 1990

## AGRICULTURE IN A WORLD OF CHANGE: QUESTIONS\*

Secretary Yeutter and Under Secretary McCormack

QUESTION: I have a question regarding the environment. We may be entering a phase of unilaterally increasing our regulation of the environment. This probably will affect our competitiveness abroad. Would you care to comment on what appropriate U.S. policies may be in this regard?

SECRETARY YEUTTER: Environmental issues are going to require a lot of our attention during the 1990's. Concerns about the environment will not disappear, because they're legitimate concerns. And as you well know, we need to be responsive to these concerns in this Nation and around the world.

But it's important to respond in a balanced way. My view of the recent votes on the "Big Green" environmental initiatives in California is that they reflect the judgment of the American public that the pendulum has swung a bit too far and that we have not been handling environmental issues in a properly balanced way.

At times there are trade-offs between environmental protection and jobs. In keeping with the democratic traditions that Dick McCormack talked about, we have tried to balance those appropriately. We can't swing the pendulum all the way in one direction or the other. We face that here, and with a whole host of other issues as well.

I hope that the votes that we saw two or three weeks ago indicate that the American public has begun to recognize that balance is essential in this area. We do have some trade-offs. It's not a black-and-white kind of situation. There are very difficult, intricate, comprehensive, and sensitive trade-offs involved.

Those trade-offs have to be made by policymakers in good faith whether they are at the Federal level, State level, or local

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\*Based on a transcript

level. They need to be made based on the best data and information available. Putting it another way, they need to be made on the basis of objective criteria for decision-making and not on the basis of sheer blatant emotionalism. I guess that's really about all one could say about it at this stage without getting into specific issues.

QUESTION: Mr. Secretary, I have a question about the GATT round. I understand that some EC speakers have been saying in the Washington area that the EC is prepared to make some stiff commitments on supply controls. Would the U.S. look favorably upon such a commitment to satisfy its demands in the GATT round, rather than the reduction in subsidies which the EC claims it cannot do for political reasons?

SECRETARY YEUTTER: We'd be delighted if the Community were to make some commitments in the supply control arena; however, that needs to be defined. I assume that setasides would be the principal area of interest in that regard.

As many of you know, the Community has had some setaside programs through the years, but they haven't worked very successfully. They've taken only a minute amount of land out of production; I think the amount is around 1 million acres while we have done 20 or 30 times that much on with just short-term setasides. The Community has begun a few things in the environmental arena that are somewhat comparable to our Conservation Reserve Program here, but not very much.

I've been saying consistently over the last three or four years that it would be tremendously helpful if the Community would move forward in this direction and achieve some environmental benefits at the same time it achieves some foreign policy reform benefits. To me they're compatible. Those kinds of efforts don't have political costs; they are political pluses. In other words, this shouldn't generate opposition within western Europe. It should generate support both from the environmental community and from consumers and others.

We see it as a political plus and as a way to contribute in a very positive way to the negotiating environment. Our judgment is that we've already given away the store in that regard. As you well know we've got 30 some million acres out of production in the Conservation Reserve and we've had something pretty close to that involved in short-term setaside programs. So we'd be delighted if the Community were to emulate that in any kind of a proportionate way.

So far the Community has done very little in that regard; in fact, not many other countries have done a whole lot either. So we'd like to see a contribution in that arena coming from others

as well.

But in terms of that meeting the requirements of the negotiations -- that's another matter. We would not consider that to be an acceptable resolution of all the commitments in all of these areas. That has nothing to say about market access. A Community commitment to engage in supply control programs in lieu of providing market access will never sell in the United States or the rest of the world. That's pure protectionism and simply is not defensible. That's what we'd call a Fortress Europe response.

There's no substitute for providing market access or for disciplining exports subsidies. Hopefully, supply controls would reduce the demands in that area because if production is constrained through the use of setaside or other programs, there would be fewer products to dump on the world market. That would be helpful.

It seems to me that through the use of those programs the Community can make and meet commitments for export subsidy disciplines. These are the mechanisms by which the Community can make these kinds of commitments to the rest of the world and meet them. We find it unpersuasive and implausible that the Community is unwilling to make commitments in this area because there are some techniques and mechanisms available to meet those.

QUESTION: What provisions may be made if the Uruguay Round negotiations are not successfully completed in December?

SECRETARY YEUTTER: Well, first of all, I'd prefer not to dwell on a failure of the Uruguay Round. It seems to me that we shouldn't write it off now, pessimistic as prospects may be. We should all go into Brussels next week with a positive attitude and with a commitment try to make the Uruguay Round succeed. But, as I said, we are not going to do that at just any price.

The President, Carla Hills, and Dick McCormack have said that a bad agreement is worse than no agreement at all, and we mean that. So we've got to have the right kind of outcome.

But if the Uruguay Round does fail, a lot of turmoil simply will be inevitable. Markets will be disrupted in a whole host of ways, because we'll have difficulties not only in agriculture, but in the industrial sector, services, intellectual property, and who knows where else.

The whole world will have to try to get itself back in focus again in the aftermath of a failed Uruguay Round -- and it's impossible to predict at this point how that might occur. Secretary McCormack indicated that such a failure could stimulate



regional trading arrangements as an alternative to GATT rules. It will certainly stimulate unilateral responses by a lot of countries. The United States certainly will re-evaluate its entire agricultural policy structure and what it must do to protect its own interests. We'll have to do that in other sectors as well.

Inevitably, the entire trading environment will become far more confrontational. In other words, if we think we've got a lot of Section 301 cases and bilateral confrontations at the moment, the numbers and the magnitudes of 1990 will be nothing compared to what we'll see in 1991 and beyond. It's not a happy scenario. All of us will pay a price for the uncertainties involved in that scenario, aside from what may or may not happen in policy changes and counter-changes.

We ought to know better. In other words, the world as a whole ought to have better sense than to go down that road, but if we can't muster the political courage to do what needs to be done in areas like agriculture, it's going to happen. And if it happens those who have not demonstrated courage will pay the price. They may need a lot more political courage to deal with the aftermath than they do to deal with the situation as it exists today.

QUESTION: Mr. Secretary, since 1973 our economy has basically been hostage to the Middle East oil situation. However, at the same time you point out that in that same period of time the export markets for our crops have been steadily shrinking.

It may not be so well known that something like 97 percent of what we call our synthetic chemical industry today could technically if not economically be converted from fossil materials to renewable materials and there I'm speaking mainly corn or wood chips or what have you.

This indeed could take care of something like 50 percent of the corn crop under the right economic situation. I'm just wondering what policies and/or programs the Department of Agriculture has or intends to have to perhaps move from a fossil to a renewable resource economy.

SECRETARY YEUTTER: I'll comment on that a bit; then I'd like Dick to comment on the likelihood of continued uncertainties and vulnerabilities in the international petroleum arena.

If we do have continued challenges in that area and undependability in terms of importer supplies, prudence calls for us to evaluate precisely what we can do from our own petroleum resources. That includes evaluating the potential for alternative fuels: for using renewable resources such as corn, sugar, wood products, and others.

Today we cannot put those products into use at a cost comparable to the cost of imported oils or fuels. But that could change both in terms of future oil import costs and in terms of the costs of obtaining alternative fuels, because we've got an opportunity for research breakthrough in that area in the next decade.

If we put money into research and development activities, who knows what it'll cost to provide ethanol, methanol, or any one of a variety of other fuels five years from now or 10 years from now? We ought to be thinking ahead in making some expenditures in that area to see whether we can provide an economically competitive product. I don't believe we ought to assume that there will be no research breakthrough in that area. We've had research breakthroughs in a lot of other things, including medical science, that have startled everybody in the world. Why should we assume that we cannot have startling breakthroughs in the provision of fuels? So I am favorably disposed.

As long as I'm here as Secretary, we're going to give some attention in the Department of Agriculture to research and development activities and, hopefully, some commercialization activities as well. I think it's worth doing simply in terms of the security of this Nation, aside from the benefits to American agriculture.

So you'll see a much more positive response out of this Secretary and this Department in that area than we've had perhaps in the past. But Dick, why don't you comment on a broader picture?

UNDER SECRETARY McCORMACK: I would just observe that I agree with almost everything that Clayton said. More research and development could result in a breakthrough that presently we can hardly imagine -- but I would add that what we do in our economy has to stand the test of the marketplace.

During wartime, you can substitute higher-cost fuels to deal with a situation, but over the long term your economy has to be competitive internationally. That means making sure that the elements that make up your economy, such as fuels, are competitive with what the other fellow is using in his products. So that is the constraint that we have to deal with.

QUESTION: In the scramble for international markets in the 1990's, I'm wondering if the United States Government will continue to focus on the needs of the Third World in terms of developing its own comparative advantages in the marketplace, or if we simply will view those countries as marketplaces for our products? How much of a role are we going to play in building them up as producers of food?

SECRETARY YEUTTER: We don't have a lot of money to spend on Third World development, as you know. Most of those programs come through the Agency of International Development (AID) and although Dick and Ron Roskins at AID and others are trying to do what they can to help Third World countries through those mini-programs, there are clear severe financial constraints on expenditures in that arena. I'll ask Dick to comment more specifically about that if he'd like to do so.

But I would add that there's a lot that the Third World countries can do to enhance their productivity and efficiency without financial aid from the developed world. These are the economic reforms that many of us have discussed with them and a lot of which are now underway.

I came back from a week in South America about 30 days ago and I was enormously impressed with some of the changes that are taking place in Chile, Argentina, Brazil, and particularly in Uruguay, and in Bolivia. Of course, the same thing is happening in eastern Europe, as Dick discussed extensively.

If the Third World would abandon some of the government entities that have existed through the years and have operated so inefficiently, if they would shift to the market economy that has served us so well, and if they would ignore our shifts away from a market economy that we do foolishly, and do as we say rather than as we sometimes do and put the right kind of market systems in place and the right kinds of economic policies, they would generate some economic growth without a lot of aid coming from the U.S. and other developed countries. So it's a combination of all those things.

Certainly the World Bank, the IMF, and others can play a major role in all of this if they properly focus their programs and that's all in our best interest. Sometimes American farmers see that as a potentially competitive environment and say, "Why are we putting financial assistance into that part of the world, because it'll come back to haunt us."

Now the experience is that that those countries will become agricultural exporters but they'll also become much larger agricultural importers. We'll have a net gain rather than a net loss. That's why I'm enthusiastic about helping eastern Europe, because I think we'll sell more agricultural products in eastern Europe if those economies get on their feet than we do now.

I think we'll sell more agricultural products to the Soviet Union if that economy gets on its feet. The same thing applies to the Third World. In my judgment, we've got everything to gain, and not much to lose in that process.



Dick, do you want to embellish?

UNDER SECRETARY McCORMACK: Well, I simply would add that I spent nearly four years as the U.S. Ambassador to the Organization of American States and I travelled extensively around Latin America. When I first took the assignment Latin America was just coming out of the first phases of the debt crisis. I recall trying to persuade various leaders to adopt policies that we thought might improve the economy, and we had a lot of difficulties.

But gradually, as the consequence of work by the International Monetary Fund which we heavily support, structural adjustment loans by the World Bank, and the sheer weight of evidence, we began to see a change in mentality, ideas, and in concept away from the state and toward free market economics.

People began to look at what happened in Chile, which had been an economic basket case and suddenly became very prosperous with a stable economy. They began to examine not what they were doing politically but what they were doing economically. The Mexicans are beginning to adopt new economic policies. The Brazilians are talking about different economic philosophies and policies. I am absolutely confident that over the next 10 or 15 years you will see dramatic improvements as these basic economic concepts now at the top start to work their way through the system, and be implemented in programs, and as whole new generations of people come from the universities with new and better ideas than those of 20 and 30 years ago.

So I think the solution is to help them get their basic economic policies right -- to work through the IMF and the World Bank to a degree. We can and are doing some things with aid, but the basic solution to those problems is for those countries to get their policies right. When that happens, everything is possible. Without that, nothing is possible.

SECRETARY YEUTTER: And that's why the Uruguay Round is important, too.

A number of the leaders in South America said to me with regularity, "You know we're doing what you folks in the developed world have insisted that we do. You've been telling us to become more market-oriented, you've been telling us to expose our industries and our firms to competition. You've been telling us this is good for us. You've been telling us to let in foreign investment and all of that. And we're doing that because we think that's right and it is the way to go to generate more economic growth.

"But then what happens? Along comes the Uruguay Round. We say



we'd like to sell rice in Japan and Japan says, 'Oh no, we have an import ban on rice.'

"We want to sell sugar in the United States and the U.S. says, 'Oh no, we have a quota program on sugar. We can't change that. We have to keep a sugar program that is cost-free to the American taxpayer. Don't sell your sugar here.'

"We go to the European Community and the Community says, 'Oh no, we can't provide market access. We have to have Community preference that favors the farmers in western Europe. They must be our first priority.'

"We come to textiles and none of you wants to buy our textiles. What are we supposed to do? How do you expect democratic societies to succeed? How do you expect a market-oriented economy to succeed in Latin America or elsewhere in the world when you developed countries want to close us out of your marketplaces?"

UNDER SECRETARY MCCORMACK: Let me make one final comment. We have seen some important progress in Asia. Forty years ago Asia was a continent of extremely poor people. We're seeing dramatic changes there as they're adopting different policies.

Latin America is beginning to show some promise there. The part of the world that's still is of great concern to people like myself is what's happening in parts of black Africa where you still have massive dislocation, and hunger on a terrible scale. There is and will be a tremendous role for imaginative assistance of various kinds to prevent sheer starvation by the innocents affected by war, dislocation, poor policies, and other horrors descending upon that part of the world.

QUESTION: Mr. Secretary, I realize that this is probably a futile question, but I'll ask it anyway. You said just a few moments ago going into Brussels next week you have to have an open mind. Keeping that in mind, and also keeping in mind that Mr. McCormack said that the U.S. is pretty much at its bottom line, Is there any give at all in the U.S. agricultural negotiating position? If there is, would that pretty much mean that the Cairns Group of countries would bolt from the table?

SECRETARY YEUTTER: Well, I can't speak for the Cairns Group, nor do I want to speak for Ambassador Hills, who will have to make the final decisions on the U.S. negotiating position in agriculture and everything else. However, everybody goes into a negotiating session with some flexibility, I hope. Otherwise we may as all stay home from Brussels next week because it would be a total waste of time.

But clearly the fundamental message is one that we have been delivering for four solid years now. We have to have meaningful, significant, substantial reforms in agriculture in all these areas: export subsidies, internal supports, market access and the sanitary area. You can't be just nibbling at the edges or making marginal changes. That's just not worth doing. Let's do it right and let's make really meaningful improvements in this area over time. I mean let's extend the time if need be so that we have a situation that is politically viable as we go through this adjustment.

We realize it's not easy in any country and so we've got to be practical and pragmatic about it. However, we can't lower our sights too far because if we do we will have the same situation we've experienced over the last 30 or 40 years and things will get worse instead of better. We've gotten some attention on this finally in the Uruguay Round, but we really need to get something meaningful accomplished on agriculture. If we don't, we're going to have a mess on our hands throughout the world, and we'll come back in the next round of negotiations with even more problems than we have right now.

We should have dealt with this issue in the Tokyo Round. The fact of the matter is we should have dealt with it before the Tokyo Round -- but what happened in the mid-1970's is that everybody ultimately punted. We had agriculture on the agenda and everybody said, "Oh it's too hard, we can't generate the political support to do this, we'll have to pay too big a political price." So everybody punted. Nobody did anything in agricultural reform in the Tokyo Round.

Where are we now? We're a dozen or so years later and everybody's saying, "Oh my God, things have really gotten worse in the last 10 or 12 years. Why didn't those blankety blank negotiators do something about this back in the Tokyo Round in the 1970's?"

Well, if we don't get it done now, in about the year 2002, there will be another round of negotiations and everybody will say, "Why didn't those blankety blank folks in political leadership positions back in 1990 do what they should have done?"

Well, the fact is that 1990 is here and all of us who are in positions of political leadership ought to do the right thing in Brussels next week. If we can't screw up the political courage to do that, we're going to pay the price.

QUESTION: What economic opportunities are there for corporations who want to invest in eastern Europe and what incentives will there be? And how would you rank the eastern European countries now in terms of American investment?

SECRETARY YEUTTER: I'd like to ask Dick McCormack to answer that since he's spent a lot of time on eastern Europe.

UNDER SECRETARY McCORMACK: Well, I would like to make the general observation that you cannot make general statements when you're looking in terms of investments. There are individual opportunities, individual countries, and individual sectors. My sense is that Czechoslovakia has some important opportunities right now. The country has some very good, sound economic policies, and it wants investment.

Of course, eastern Germany has got thousands of state-owned factories that the government is currently trying to get rid of. There's some opportunities there.

In the case of Poland there have been some important discussions that have taken place and various opportunities that exist there. As I say, the key thing is for people with specialized knowledge and specialized technologies to look at specialized situations that exist in eastern Europe.

It's there. You've got to weigh every single one of these opportunities, every single business, every single firm, every single industry just as you would if you were investing anywhere else. Is it a good deal or not a good deal? Is the product good or is it not good? Is there an open market here or is there not an open market here? So I just don't think there is a general answer to your question.

SECRETARY YEUTTER: You know, there are a lot of places around the world where we Americans can be making investments, not just in agriculture but in other areas as well.

Eastern Europe certainly has some possibilities, but there are plenty of other places. It's important because investment and trade go hand in hand. Admittedly there are some risks in making investments around the world. But if we're unwilling to make investments around the world, we're not going to have the trade volumes that we could have. The two do go hand in hand.

The reason I wanted to add that was that I was in East Asia in August visiting a number of countries including Malaysia and Thailand. In both of those countries the prime ministers strongly encouraged additional American investment. They were asking why more American firms don't put money into Thailand and Malaysia and elsewhere in Asia. The fact is, we ought to.

Here are a couple of countries that right now average economic growth rates of 10 percent per year. How can you find a much more attractive investment environment than that?



And yet, there is little American investment in Thailand and Malaysia. I talked to someone over there and I asked, "How are the American investors doing in Thailand?" He just laughed at me and said, "You've got to really be dumb in order not to make money in Thailand these days."

Why can't we extend our horizons a little bit and do business in countries such as those instead of sitting here complaining that nobody's buying as much as product as we want them to buy? One of the reasons they don't buy more from us is that we haven't been out beating the bushes with either investment or trade.

QUESTION: Let's assume that the EC becomes a stumbling block in the trade negotiations and that there is no way out. Let's also assume that what matters is efficiency in a free trade environment. Would you be willing to isolate the EC and make a deal with the rest of the world, including Third World countries?

SECRETARY YEUTTER: Now that's a very profound question. That's the most profound question of the morning by far and I'm amazed that this is the first time that anybody has asked me that question during all the debates in the Uruguay Round over the last four years. I would have expected that question to have surfaced a long time ago, but it hasn't. I have thought about it because I've posed that question to myself.

I can't answer that today because I really don't want to respond to a hypothetical question, but the thought has crossed my mind. Perhaps we should just leave it at that for the moment.

QUESTION: Mr. Secretary, to what extent will the negotiations over intellectual property rights or trade in services influence the agricultural negotiations next week?

SECRETARY YEUTTER: The fact is they're all interrelated even though they're separate negotiating groups. When you get down to the final negotiating session, everything becomes intertwined with everything else. Groups in the U.S. and other groups in other countries will say, "Oh my goodness, we're going to be traded away for the other guys."

And I was in a session just the other day where somebody was reading a letter from an industrial group to Ambassador Hills asking that she be sure that the industrial sector of the U.S. isn't traded off next week in Brussels.

We're not going to trade the industrial folks off for the agricultural folks. I've been getting letters from the agricultural groups saying, "Make sure that we're not traded off for the industrial sector." And I'm sure that's happening in



every country now, but the fact is they all intertwine.

What we have to hope for is acceptable outcomes in every group, but it'll be a very difficult situation for Ambassador Hills to manage. She'll have 15 negotiating groups in Brussels next week, all of which are trying to move to definitive conclusions. Eventually there will be some trade-offs between and among them all. That's bound to occur. It's a very challenging task for Ambassador Hills and her negotiators, but I have a high level of confidence in them.

I sometimes get a little distressed with U.S. groups -- industrial or agricultural -- who worry about somebody giving away the store in Brussels. In my judgment we have an outstanding group of negotiators going into Brussels. We have had an outstanding group negotiating on issues bilaterally and multilaterally for the last several years and to me that ought not be a concern.

We will have to make trade-offs if there is to be a successful outcome next week in Brussels. Not everybody is going to be happy with the trade-offs, but the evaluation has to be on the basis of whether the package that's brought back by Ambassador Hills is in the long-term interest of the United States.

If it is, then it ought to come and the Congress ought to approve it. If it isn't, then I don't think she'll bring it back, because she's certainly perceptive enough to recognize what will be viable here in the United States.

Dick, did you want to add anything?

UNDER SECRETARY McCORMACK: No, I want to just pick up on something that you said here. There are 15 different subject areas, each one of which is unbelievably complicated and technical. I have a friend who is a key official in the GATT who called me a month or so ago to say that even he did not fully understand what was happening in all 15 of these areas.

So what you've had, in a sense, in some of the countries is a disconnection between the technicians as they deal with each one of the 15 areas, and the political leadership in some countries that doesn't really understand all the details. They don't understand the implications of what's happening; they don't understand issue 1 or issue 2 or issue 3 or potential trade-offs. That's made this negotiation a very, very difficult one for the political leadership in many countries to come to grips with.

My assumption is that by the time that we get to Brussels the briefing processes will have occurred to the point that the

political leadership can give direction to the technical people that will enable concessions to be made.

As as you know, in every one of these areas there are political sensitivities. The technical people actually involved in the negotiations were not in a position to make the political compromises necessary to move the negotiations forward. The politicians didn't fully understand what was happening in the negotiating sessions, so they couldn't give instructions to the technicians. That is one of the problems we've had on this negotiation year after year.

SECRETARY YEUTTER: I'd just like to quickly add one political point. I think there is some fear of the GATT and the Uruguay Round process by many people in the U.S., including farmers. That's not true of the group that's here, because you're very knowledgeable and have a comprehensive understanding of the Uruguay Round, but a lot of folks don't and their immediate reaction is "Oh my God, what are those folks doing over there ... we don't understand the GATT ... We don't understand the Uruguay Round ... We don't understand all those 15 negotiating groups. Why don't they just go away and let us live as we have in the past?"

The message we have to deliver on that -- and it's really an educational process for all of us around the world -- is that the GATT isn't going to go away. At the very least, some kind of an institution dealing with international trade is going to exist forever, presumably. We can't stick our heads in the sand and let the rest of the world go by.

As Dick McCormack pointed out earlier, it would be tragic if the United States sought to be isolationist. It would be tragic for the U.S. as well as for the rest of the world. We have to be more intelligent than that. We have to recognize that the rest of the world is going to be here whether we like it or not, and that we're going to have to do business with the rest of the world whether we like it or not. It's going to be in our own self-interest to do that. It is in our own self-interest to do that on as near to a level playing field as we can get.

We're not going to totally flatten the playing field in the Uruguay Round in agriculture or anything else. If people have those kinds of expectations, they ought to lower them right now. That's simply not in the cards, but I would hope we come out of the Uruguay Round with a much flatter playing field than exists today. If not, then it's been four wasted years and we ought to have enough self-confidence to operate on that basis. If we don't, then we'd better go back and figure out why we can't compete with the rest of the world -- and that's a whole different topic in itself.

QUESTION: Mr. Secretaries, has there been an analysis from the agricultural experts in the administration about the possible use of force in the Persian Gulf area in terms of its impact on the agricultural economy?

SECRETARY YEUTTER: I'm not sure that there's been anything specifically done. You might want to pose that question to Bruce Gardner when he comes back later on in this program. I'm certain that there's a data base there on which one can work with a variety of assumptions, but obviously there are some major uncertainties.

It's very difficult to predict what will happen in agriculture when we don't know what would occur in any hostilities that emerged, but one could make various assumptions on that. Aside from that, of course, the question is to what degree can Middle Eastern product be replaced by product elsewhere in the world including in the U.S. Certainly the Energy Department of the U.S., our own people, and others have considerable data with which to work in that arena, but I can't give you anything specific right now. You might pose that to Bruce or you might want to pose it to the Department of Energy people as well.

We're not sleeping on that subject but clearly there one has to have a lot of different hypotheses because of the unknown element in hostilities.

Dick, do you want to supplement?

UNDER SECRETARY McCORMACK: We of course hope Saddam Hussein will see the forces assembled against him and withdraw from Kuwait. That's the President's hope -- that's the hope of all of us. Had this crisis occurred 10 years ago, we would have an altogether different situation, because we would have the prospect of another superpower supporting Iraq.

What you have now is a fairly contained regional problem that has to be dealt with, but its implications on the broader scene are relatively containable. Had we done nothing -- had we let them go on and move into Saudi Arabia and then confronted them, there would have been tremendous warfare which would have destroyed the Saudi Arabian oil fields. Then you would have had an impact on every farm and every family in America, because the price of oil would have gone to \$50, \$60, \$70, \$80 a barrel before the thing was over. We don't think that's going to happen now.

We believe we have enough power assembled right now on the Kuwaiti border that there is virtually no prospect of Iraq -- even under a worst case scenario -- being able to disrupt Saudi Arabian oil on any kind of a sustainable basis. They may get a

rocket off here or there, but that's about the end of it.

SECRETARY YEUTTER: Again, Dick, thanks so much for joining me here today. Thanks to all of you for coming and please stay with us as we fight through all these battles in the coming weeks and months. There are going to be a lot of them no matter what transpires next week. And in Brussels, we'll do the best we can for American agriculture next week. That's all we can promise you at this point.



# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture

Washington, D.C. 20250-3900



Outlook '91, Session P2

Tuesday, November 27, 1990

## 1991 OUTLOOK FOR THE U. S. ECONOMY

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I think the proper place to begin discussing the U.S. economy is to refer to a quotation from Dick Cheney, our Secretary of Defense. He recently said, "I can't find anybody who knew 18 months ago what was going to happen over the past 18 months."

Such confusion is typical of economics. I can tell you where I think we are and I can give you an estimate of where I think we'll go, but this is an unusually complicated and confusing period of time.

Where we are now is fairly straightforward. Eight years ago, we began an economic expansion which has now reached a record length. During that period, we had relatively stable inflation and created about 20 million new jobs.

However, our economic growth rate clearly has slowed down. During the last 21 months, going back to the beginning of 1989, the economy's domestic growth rate has been only 1.3 percent. That performance can be compared with the 2.7 percent growth rate of the last 20 years and the 3.7 percent growth rate of the cyclical expansion that began at the end of 1982. So, for at least 21 months, the U.S. economy has been sluggish and growing at a rate below what the Bush Administration and most private forecasters believe is the underlying potential for growth.

It is true that in the third quarter, we had a relatively strong surprise. The preliminary figure announced a month ago indicated that the annual rate of growth during the third quarter, July through September, was 1.8 percent. That figure will be revised tomorrow. I won't know what the figure is until 8:30 tomorrow morning, but we expect it to be revised upward by a small amount.

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\*Based on a transcript

Thus, it appears that at least through the third quarter the economy has continued to grow. During the third quarter, the economy probably grew at a rate of 2 percent or slightly better. However, that figure does not reflect the current strength of the economy. We know that as the third quarter progressed, the economy lost its zest, and that by the end of the quarter it was travelling at a slower pace than it was at the beginning of the July-through-September time period.

We also know that the fourth quarter is off to a very sluggish start. The employment figures for October indicate a loss of jobs. The new employment figures for November also will report a significant loss of jobs when they are published in a few days.

The survey of purchasing managers shows a pessimistic outlook, and we've had a variety of discouraging signals from the automobile industry such as a moderation of sales, and, more ominously, cutbacks in production schedules.

I think that what we're beginning to see in the economy is an evolving pattern of economic activity that I refer to as a sheep-and-goats dichotomy. This is somewhat comparable to the early 1980's when certain geographical areas --the coastal States, California, the Eastern Seaboard -- were doing well economically, while the interior 34 States (those who bend metal or grow things or dig up things out of the ground) were not doing well.

The dichotomy was both geographic and sectoral. In the early 1980s, agriculture, energy, and export-related manufacturing did rather poorly. However, sectors based on consumption -- particularly financial services, real estate, hospital care, education, defense orders -- were doing very well. These sectoral and geographical distortions tended to disappear as the cyclical expansion continued. Conditions became more normal as export orders recovered and domestic investment in new plants and equipment strengthened. At the same time, consumer spending moderated. Geographical gaps have returned however, as areas dependent upon defense orders, financial services, and construction are experiencing difficulty. This deterioration is particularly evident in the New England and mid-Atlantic States, whereas economic activity has been stronger in the West and Mid-West areas.

Looking at economic prospects, it appears that the third quarter of 1990 probably will mark the end of the sustained economic expansion and that the fourth quarter will report negative output results. The period of slow economic activity will likely stretch into 1991.

Personal consumption expenditures, which make up two-thirds of the gross national product, continue to report positive gains. The American consumer, however, is very cautious because the recent acceleration of inflation -- linked to the oil price shock that started in August when Iraq invaded Kuwait -- has eroded the

purchasing power of current incomes. This important sector probably will report modest results at best. In fact, retail sales have been flat for almost two years and the outlook for holiday sales is somewhat pessimistic. The steady growth of consumer services spending has partially offset this weakness but even the services sectors have been restrained by the sharp drop in consumer confidence reported since August.

It is interesting to review the historical pattern of consumer confidence measures. In October 1973, the first oil shock occurred when an embargo of oil shipments to the United States was declared by OPEC (Organization of Petroleum Exporting Countries). During the next 12 months, world oil prices approximately doubled, and the consumer confidence measure dropped 11 percent. The second oil shock occurred in 1979 and 1980 when the Iran-Iraq war disrupted world oil export markets. Once again, world oil prices doubled during the subsequent 12 months, and the consumer confidence measure again declined by 11 percent. The current experience has been very different. Oil prices again have doubled -- rising from \$16 per barrel in July to \$32 or \$34 per barrel, but the consumer confidence measure has plummeted downward by 42 percent. There is obviously a great deal of concern at both the consumer and business level and the resulting uncertainty has hurt the overall economy.

The housing sector is a particularly weak part of the economy. A secular decline in new housing starts has been underway since the mid-1980s and the residential construction sector of the GNP reported a real decline of 15 percent during the third quarter of 1990 at a seasonally adjusted rate. Part of this decline reflects the demographic trends created by the slowdown in new births since 1965. The smaller number of young adults has restricted demand for multiple-unit apartment projects. Instead of building 600,000 to 700,000 multiple-housing units per year, as occurred during the late 1970s and early 1980s when the baby boom generation was maturing, only 187,000 units were started in October 1990 (expressed as a seasonally adjusted annual rate).

At the same time, business investment in new plants and equipment has been one of the stronger sectors of the economy. Much of this sustained demand reflects the improved export performance of American companies and farmers. It is expected that the export sectors will remain a major source of strength in the U.S. economy during the approaching year and throughout the 1990s. The international exchange rate for the dollar has declined since February 1985, and exports have surged upward since 1987. Exports continue to rise at about an 8 percent annual rate, while imports go up 2 percent each year. The United States had significantly reduced its record trade deficit of \$152 billion reported in 1987 to less than \$100 billion (annual rate) before the oil-price shocks related to the Middle East tensions pushed up the current oil-import bill.



In summary, the economy can be divided into two categories --the sheep and goats dichotomy -- with parallel sectors of strength and weakness. There are some categories reporting sustained growth, such as consumer services, business investment in plants and equipment, exports, and certain types of government spending. Other parts of the economy, such as residential and commercial construction, consumer durable goods spending, and general government spending are suffering at this time. Certain geographical areas, particularly New England and the mid-Atlantic States, are experiencing serious difficulties.

Turning to the current economic forecasts for 1991, it is significant that a group of 55 private economists, referred to as the Blue Chip Consensus, now believe that a brief and relatively mild recession will occur. Eighty percent of the Blue Chip forecasters predict that an official recession will begin during the last three months of 1990 and extend through the first three months of 1991. The two consecutive quarters of negative economic results are one of the guidelines used to define an official recession. At this time, most participating economists expect economic growth to resume during the second quarter of 1991 leading to a solid recovery during the second half of next year.

The potential world price for oil will be a major factor in determining the actual pattern of economic activity during the next 12 months. Current futures prices for oil over the next 12 to 15 months indicate that most analysts expect prices to drop sharply to a level in the low-\$20 range as the serious Middle East problems are resolved. This happy scenario would reverse the recent explosion of energy prices that have pushed the overall inflation rate to very high levels during the last three months. There are significant signals that the temporary surge of inflation caused by the oil-price shock may be turning around. In fact, increases in the "core" rate of inflation -- the residual rate after removing the temporary effects of energy and food price changes -- have been moderate. If this improvement in the overall inflation rate continues, based on future oil prices returning to the low-\$20 range now anticipated, then I believe that the U.S. economy will be able to resume growth in 1991 after experiencing an economic downturn that probably began sometime during the third quarter of 1991.

The official Federal government forecast is prepared by the TROIKA -- a combined effort of the Department of the Treasury, the Council of Economic Advisers, and the Office of Management and Budget. The forecasts are issued twice each year: when the President's budget is published in February and each July as part of the mid-session budget review. In 1990, the TROIKA prepared an additional forecast as part of the budget summit meetings, which culminated in the new budget-deficit reduction agreement at the end of October. In that special forecast, the TROIKA predicted that growth during 1990, measured from the fourth quarter to the fourth quarter, well below the historical average



pace and even slower than the sluggish performance of 1989. For 1991 the TROIKA predicted a modest acceleration of growth at a 1.3 percent pace for the entire year, which would result from a resumption of positive growth by the middle of the year. At the time the forecast was prepared, it was the second-most-pessimistic forecast available with regard to economic growth and the most pessimistic estimate of prospective inflation. In fact, the most recent Blue Chip Consensus forecast, prepared two months after the TROIKA estimate, continues to predict more optimistic inflation results for 1990 and 1991 and a slightly more optimistic growth figure for 1990 and a modestly more pessimistic growth rate for 1991. It should be emphasized that the TROIKA forecasts prepared to serve as the official Administration estimates are not based on the infamous "rosy scenario" procedures.

Nevertheless, it must be recognized that the TROIKA's estimate of 1.3 percent growth in 1991 depends on what happens to oil prices during the next year. If oil prices remain at current high levels and continue to push up overall inflation rates, the U.S. economy could suffer a more difficult cyclical downturn. If the oil prices recede, and the overall inflation rate declines to the "core" rate that persisted prior to the oil price shock, then the underlying strengths in the economy, particularly prospective exports and consumer spending for services, should be enough to rejuvenate economic growth as 1991 progresses.

Finally, with regard to economic policies, the Federal Reserve Board has responded since July with modest reductions in the Federal funds rate, the interest rate charged on overnight borrowings to meet legal reserve requirements. This crucial rate has dropped from 8-1/4 percent to 7-1/2 percent since the easing action began. Other short- and long-term rates have declined 30 to 70 basis points. The Federal Reserve Board appears to be pushing interest rates down carefully, and this sustained action should contribute to economic growth in 1991.

With regard to fiscal policy, most analysts have concentrated on the five-year plan to reduce prospective budget deficits. It should be noted, however, that Federal government spending is already programmed to increase in fiscal year 1991, which began October 1. This expected budget spending pattern, particularly defense outlays caused by the Desert Shield operations, will provide some stimulus for growth. The tax increases agreed to tend to concentrate on specific consumption sectors, such as the 5-cent-per-gallon gasoline tax and various excise taxes on certain consumer goods, so fiscal policy should not be restrictive.

In conclusion, the U.S. economy is going through a very difficult period. We've had eight consecutive years of sustained growth, with relatively stable rates of inflation during most of that extended period, and the economy has added 20 million jobs during the cyclical expansion. At the same time, it is clear that the

domestic economy has experienced sluggish growth and now faces a possible downturn. The economy has again into strong and weak sectors -- the sheep-and-goats dichotomy -- and events have been influenced by the severe oil price shock, and the resulting impact on consumer and business confidence. Economic growth should resume in 1991 but prudent monetary and fiscal policies will be required to help guide the economy back to sustained growth. Let me end with this comment and answer your questions.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

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## WORLD AND U.S. AGRICULTURAL OUTLOOK

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U.S. Department of Agriculture

### Overview

The world agricultural outlook is highlighted by rising commodity output and slightly stronger demand. World crop production and animal product output are both forecast to expand from last year's increased levels. World commodity consumption is being supported by economic expansion, population growth and plentiful supplies for most commodities; however consumption gains will be more moderate this year and use of a few commodities will be down. Look for commodity prices on a par with last year, or higher, except for wheat.

This outlook points to a year of near-record incomes for U.S. farmers. Cash receipts will rise with larger marketings and higher prices for a few commodities. At the same time, production expenses will increase, importantly reflecting higher prices for energy-related inputs. Even with larger expenses, producers will see cash farm income of \$55 to \$60 billion, slightly below 1990's record high of \$59 billion. Forecast net farm income of \$44 to \$49 billion compares with 1990's estimate of a record \$49 billion.

The 1991 outlook calls for larger food supplies, dampened inflation and a slower rise in food prices. Retail food prices are forecast to increase 2 to 5 percent, well below the 6-percent increase estimated for this year.

U.S. crop acreage will expand for several crops in 1991 as producers take advantage of more planting flexibility under new farm program provisions. In the 1990's, U.S. exports will be boosted as international trade and farm policy reforms open up world markets for U.S. producers.

### Commodity Outlook

World commodity production will increase substantially in 1990/91, with crops responding to favorable weather in a number of countries around the world. Animal product output in 1991 will reach a new record as red meat recovers and poultry supplies continue to increase.

World commodity consumption will show at least modest gains for most commodities, responding to: Real economic growth of around 2 percent; meat output 2 percent larger; and population up 1.7 percent.

These factors will strengthen the demand for agricultural products. However, shorter supplies are limiting use of a few commodities, particularly cotton.

Some U.S. products will face increased competition from expanded production in other countries, particularly for wheat. U.S. meat export increases likely will slow as Japan cuts back imports.

### Grains

The big news next year will be grains, and plenty of it. For the last three years, the world has been consuming more grain than it produced, working down stocks. But production shot ahead this year. While grain consumption is rising by another 2 percent in 1990/91, production is up 5 percent to a new record. Prospective stocks in relation to use remain below average at 18 percent (Figure 1).

U.S. grain production also is slightly above total use. Domestic consumption will move up but exports will decline and stocks will be up. Carryover stocks in relation to use will remain at a relatively low level of 21 percent (Figure 2).

### Wheat

Wheat accounts for much of this year's grain crop increase. In fact, the increase in global output this year is larger than the 1989 U.S. wheat crop. The global wheat outlook for 1990/91 also is highlighted by prospects for smaller world trade and a rise in stocks. Even with a sharp gain predicted for world wheat consumption, ending stocks will be up sharply. It's important to note, however, that stocks still will be well below levels of the mid-1980's.

The outlook for U.S. wheat in 1990/91 is for a near-record crop, lower carryin stocks, smaller exports, and larger domestic use, with ending stocks possibly rising to their highest level since 1987/88.

U.S. harvested acreage is up 12 percent from 1989 to the highest level since 1982. The larger area and record yields are resulting in a crop more than a third above 1989. Favorable weather conditions resulted in a 40-percent-rise in winter wheat production. Spring wheat and durum output are also up, as sharply higher yields more than offset lower area.

While carryin stocks were down one-fourth, the larger crop is pushing U.S. 1990/91 supplies up a fifth. Sharply lower wheat prices are encouraging wheat feeding and total domestic use is forecast up almost 30 percent. However, increased competition and slightly smaller global trade are forecast to depress U.S. exports 13 percent below last year's level.

World wheat trade in 1989/90 was largely unchanged from a year earlier and, despite the lowest prices in many years, a small decline is expected in 1990/91. A record crop is indicated for China and the second highest crop on record is forecast for the USSR. Forecasts for



## World Grains

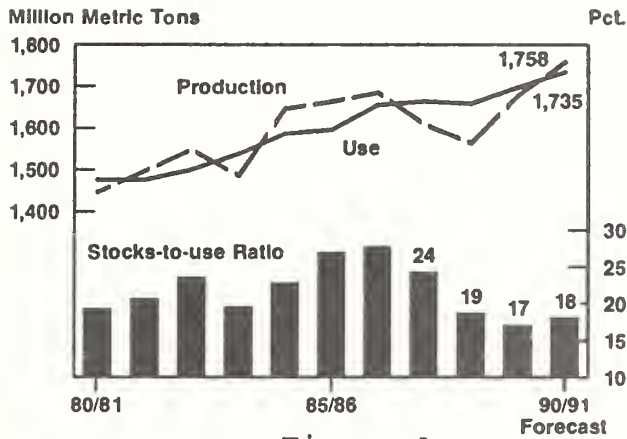


Figure 1

## U.S. Grains

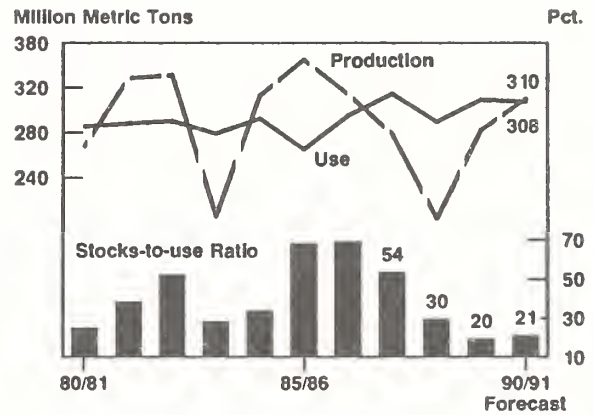


Figure 2

## World Soybeans

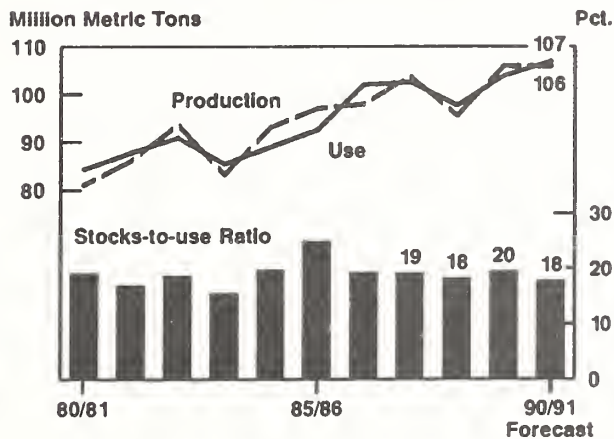


Figure 3

## U.S. Soybeans

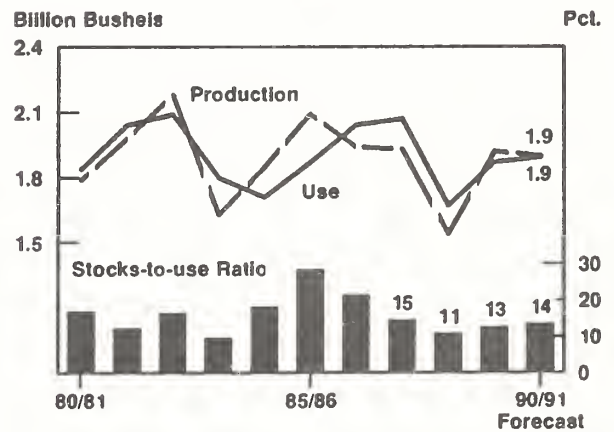


Figure 4

## World Cotton

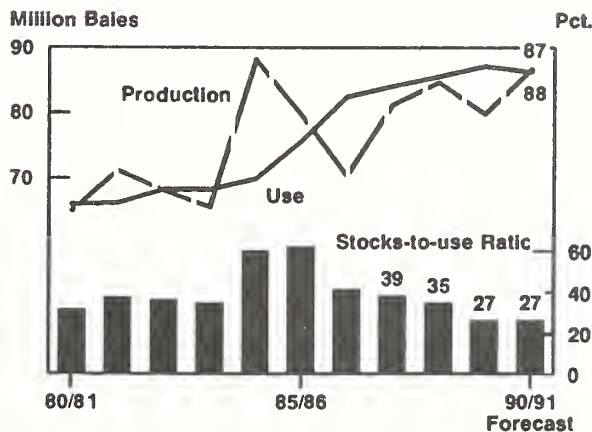


Figure 5

## U.S. Cotton

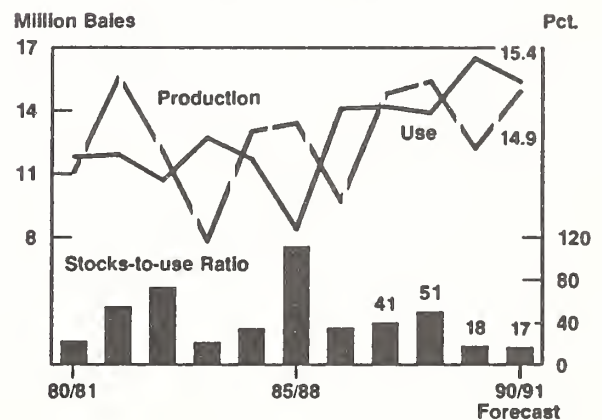


Figure 6

China and the USSR, the world's two largest wheat importers, are down 1.5 and 1 million tons, respectively, from last year. Still, Soviet imports are projected to remain relatively high, as Soviet producers are selling only a small percent of the crop to the State. For China, robust consumption gains are keeping China's import needs relatively strong. World trade outside of the USSR and China is likely to be up only 1 to 2 million tons in spite of sharply lower world wheat prices.

U.S. wheat production will likely be down substantially in 1991 because of relatively weak prices and higher acreage reduction requirements and the reduced payment on triple base acres. The relatively low world prices could also result in smaller foreign production, although the drop may be constrained by a lack of better alternative crops.

### Rice

Global rice production in 1990/91 is forecast at a record level, up 1 percent from last season's bumper crop. A favorable monsoon over most of South and Southeast Asia resulted in record yields for many countries in the region. However, unfavorable weather and insect damage in parts of Thailand likely will reduce production.

U.S. production in 1990/91 is essentially unchanged from last year, although milling quality is not as high. Domestic and residual use in the season ahead is forecast to rise nearly 8 percent, more than offsetting lower exports. The U.S. market share is expected to remain at about 18 percent in calendar year 1991. Carryout stocks in 1990/91 are forecast to fall 10 percent to the lowest level since 1980/81. The season-average price is forecast at \$6.50-\$7.50 per cwt, compared to \$7.30 indicated for 1989/90.

Given normal weather, global rice production should expand next year and prices decline further. Over the next several years, the marketing loan program will ensure that U.S. export prices are competitive. However, as long as U.S. supplies remain tight, exports will have to compete with expanding domestic use.

### Coarse Grains

The global coarse grain outlook for 1990/91 is highlighted by larger supplies but a further decline in stocks, especially in the United States. World coarse grain trade will slip from the relatively high 1989/90 level. Smaller imports by the USSR, Mexico, Japan, and several smaller importers are forecast to result in a 10-percent reduction in world coarse grain trade. U.S. exports are forecast down over 15 percent, led by a drop in corn.

World 1990/91 production is forecast up 2 1/2 percent from a year earlier because of larger U.S. and foreign crops. Foreign 1990/91 beginning stocks are down 7 percent from a year earlier and U.S. carryin stocks are down over 30 percent, offsetting the larger production and resulting in world supplies 1 percent below 1989/90.

The United States features larger feed grain production. However, reduced carryin stocks will result in 4-percent lower supplies. Although total use is forecast to drop because of smaller exports, use will still exceed production and stocks will continue to drop.

This year's U.S. corn crop of nearly 8 billion bushels is the largest since 1986/87, with both harvested acres and yields up. Production of the other feed grains is mixed, ranging from a 9-percent drop for sorghum to a 4-percent gain for barley. Domestic corn use is expected to continue expanding this season, while exports will fall with sharply lower Soviet imports. Still, total use will exceed the crop and stocks will be cut by 8 percent.

World corn trade was up sharply in 1989/90, but a drop of about 9 million tons is forecast in 1990/91. With a much larger USSR grain crop and higher procurements of grain by the State from Soviet producers, Soviet corn imports are forecast down a third. A much larger corn crop and sharply higher exports are forecast for China. However, exports by the EC, Eastern Europe, and Thailand are expected to decline from 1989/90 levels. Thus, while the United States market share will remain near last year's level, the drop in world trade will lead to lower U.S. corn exports. However, if there are problems in Argentina and South Africa during the upcoming growing season, U.S. corn exports and/or China's could be even larger.

U.S. corn production will likely increase in 1991, assuming trend yields. There is likely to be some increase in 1991 foreign coarse grain production, although there likely will be little change in plantings by the major competitors. In Argentina, the potential expansion in corn will depend on prospective costs and returns relative to oilseeds. Expansion opportunities are also limited in Thailand because of land constraints and expanding domestic use. On the other hand, a return to normal weather should lead to higher coarse grain production in the EC and Eastern Europe.

### Oilseeds

Global oilseed supplies are forecast at a record high level of 217.5 million metric tons, up 3 percent from 1989/90. Most of the gain is in oilseeds other than soybeans and mainly concentrated in net importing countries, such as the EC, China and India. This means that competition with U.S. soybeans is less obvious than is the case when soybean production increases in exporting countries. It also means more pressure on oil supplies than on meals, since the production gains are in crops with higher oil content.

World soybean production is forecast to be down very slightly in 1990/91, with both U.S. and South American crops on the decline (Figure 3). Brazil's soybean crop size is still highly uncertain as scarce credits for this fall's planting and uncertain price prospects will result in area cutbacks. On the plus side, a strong gain in China's soybean crop is moderating the decline in global production. Also, very favorable late-season growing conditions in the United States minimized the decline in the U.S. soybean crop.



World demand for soybeans and its products has been sluggish all year. The larger overall supply prospects for the coming year point to further easing. The centrally-planned economies have been a big factor in this slower growth. Recent soybean meal purchases by the USSR point to some pickup in their import levels but their ultimate level of imports, along with Eastern Europe's, are major uncertainties in this year's outlook.

The weaker dollar has been helping global soybean meal use, particularly in Western Europe. Larger supplies of domestically-produced meals, however, will moderate use gains in 1990/91. In sum, global soybean meal use will rise in 1990/91 but fall well below trend growth rates. Our domestic market is also likely to experience slower meal demand growth.

World vegetable oil supplies generally remain large, although inventories have moderated from the peaks reached in 1987/88. Strong growth in palm oil and in high-oil-content seeds have led to large oil inventories outside the United States. Strong recovery in U.S. soybean oil domestic use has been a factor in tightening U.S. soybean oil inventories, but, our exports continue to slide.

For the United States, soybean supplies are expected to exceed total use in 1990/91, leading to a further buildup in stocks to 255 million bushels (Figure 4). Domestic use is rising but a likely decline in exports will hold total use to little more than last year's levels. Soybean and soybean product prices are likely to average near 1989/90 levels as stocks build. In addition, prospective higher oilseed plantings in the United States for the 1991/92 crop may act to restrain prices in late 1990/91.

### Cotton

Prospects for 1990/91 are for a continuing close balance between global cotton production and consumption, with carryover stocks at the lowest level in a decade. Output is projected at nearly 87 million bales, almost one-tenth above last season as higher prices are spurring larger acreage and production in a number of countries, including the United States, China, India, Pakistan, and Australia (Figure 5). World consumption, forecast at more than 86 million bales, remains particularly strong in Pakistan and India. However, global use this season is down about 1 percent from 1989/90's record high, reflecting tight supplies in the United States and China and some economic problems in the Soviet Union and in Eastern Europe.

World trade of slightly over 24 million bales is expected to approximate last season's level. This season's ending stocks are placed at 23 million bales, unchanged from the beginning level, and equal to 1989/90's record-low 27 percent of use.

The U.S. cotton outlook for 1990/91 features relatively strong demand and extremely tight stocks (Figure 6). Although the crop is up one-fifth to nearly 15 million bales, total use is expected to exceed this level as mill use



is projected at 8.4 million bales and exports are placed at 7 million. Consequently, ending stocks are forecast at 2.6 million bales, 13 percent below the carryin. The indicated stocks-to-use ratio of 17 percent is the lowest in 40 years.

The early-season outlook for 1991/92 points to a rebuilding in U.S. cotton stocks, based on the need for larger production to satisfy prospects for continuing strong use and to provide for an adequate carryover. The new Farm Bill specifies that stocks be targeted at 30 percent of prospective use. The 1991 cotton program is expected to be announced within the next few weeks.

## Sugar

World sugar supply and utilization are expected to be in near balance in 1990/91. Last season also was closely balanced, but followed four consecutive years when world consumption outstripped production, drawing stocks down to very low levels. World sugar stocks remain very tight. World carryover at the end of the 1990/91 season--looking at each country at the end of its own marketing year when stocks are at their lowest--is forecast at 17 percent of consumption, similar to last season and well below the average of the 1980's which was 24 percent.

Last April, the world sugar price reached 16 cents per pound for a brief period, but dropped sharply to the 9-10 cents range after it became clear that world production last season was sufficient to cover demand, and that the outlook for this season's production was favorable. The continued tight supply situation should keep prices from dipping much below their current level this season.

In 1990/91, U.S. sugar production is forecast to decline for the third straight year. Drought in the Red River Valley of the North, the after-effects of last December's freeze in the Louisiana cane fields, and reduced acreage in California and Hawaii have all taken their toll on this year's harvest.

U.S. sugar use in 1990/91 is expected to increase about 1 percent, representing the fifth straight year of rising consumption. However, sugar's share of domestic sweetener use continues to fall as high fructose corn syrup and non-caloric sweeteners continue to cut into sugar's slice of the domestic pie, especially in the fast growing convenience food sector.

On October 1, the United States, complying with a GATT ruling, abolished its absolute import quota for sugar. Replacing it is a tariff rate quota which uses economic incentives to limit imports. If this year's tariff rate quota is filled, U.S. imports of sugar for consumption will be roughly equal to the quantity entered under the old quota last fiscal year. This would give imports about 23 percent of the U.S. domestic sugar market.

The United States also imports substantial amounts of sugar outside the quota system--about one-half million tons--for refining and re-export. This business utilizes refinery capacity made available as HFCS expanded its share of the U.S. sweetener market.

Sugar stocks in the United States at the end of this marketing year are expected to remain near last year's low level, accounting for less than 16 percent of the year's total sugar use. This relatively tight supply situation is expected to keep domestic prices near current levels, that is, about a penny and one-half above the level of 2 years ago.

### Livestock and Poultry

World animal-product output likely will increase a little over 2 percent in 1991, following an expected rise of less than 1 percent for this year. World red meat production was down slightly this year, but an increase of almost 2 percent is expected in 1991. Poultry meat production continues to expand, up over 4 percent in both 1990 and 1991. World beef production has not changed much during the last 4 years and little change is anticipated for 1991. Pork production slipped a little in 1990, but a small rebound in output is likely next year.

Total meat production in the United States in 1991 is expected to increase over 3 percent from this year's record large output. This year beef and pork production are down from the year-earlier level while broiler output is expanding over 6 percent. Increases in beef, pork and broilers are expected in 1991.

The U.S. cattle inventory at 99.3 million head on January 1, 1990, was up only 0.2 percent from the 1989 level and down 0.3 percent from 1988. A small increase in the 1991 inventory is likely. The cow inventory at the beginning of 1990 was about unchanged from the previous year; a small increase in beef cows was about offset by a slightly lower number of dairy cows. The indicated calf crop for 1990 is slightly lower than the previous year.

Placements of cattle on feed this summer were up 11 percent from a year ago while marketings were off nearly 3 percent. On October 1, the number of cattle on feed was 10 percent larger than a year earlier. This fall, placements are expected to be down from the high levels of a year ago and marketings should increase. This would leave the number on feed at the beginning of 1991 only slightly larger than the year-earlier level. Placements during 1991 are expected to be up slightly and support a small increase in fed cattle slaughter. Cow slaughter in 1991 likely will increase slightly and combined with the larger fed slaughter it will push beef production up about 1 percent (Figure 7).

Pork production will be down around 3 percent this year and an increase of about 3 percent is anticipated for 1991 (Figure 8). Producers have had good returns for over a year and the response to these returns shows more restraint than in the past. In September, producers reported intentions to increase sow farrowings about 2 percent during the September 1990-February 1991 period. Farrowings are likely to show larger increases in the March-May period. Barrow and gilt prices in 1990 will average over \$10 per cwt above the 1989 level. Prices are expected to average \$50 to \$56 in 1991 compared with this year's \$55 to \$56. This would give producers another year of favorable returns given current expectations on feed costs.

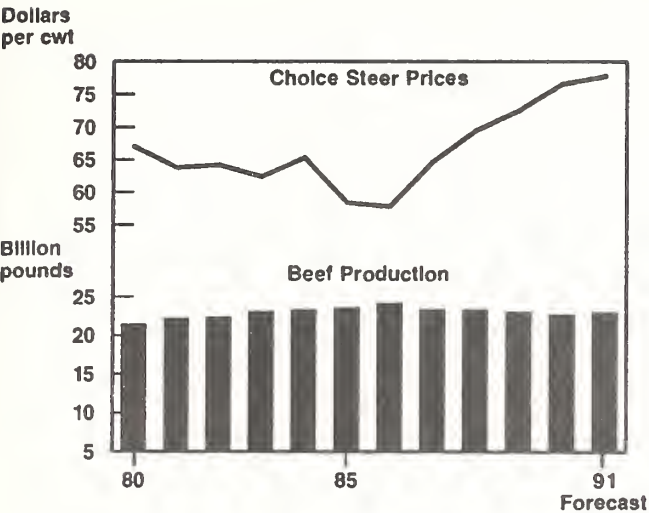


Figure 7

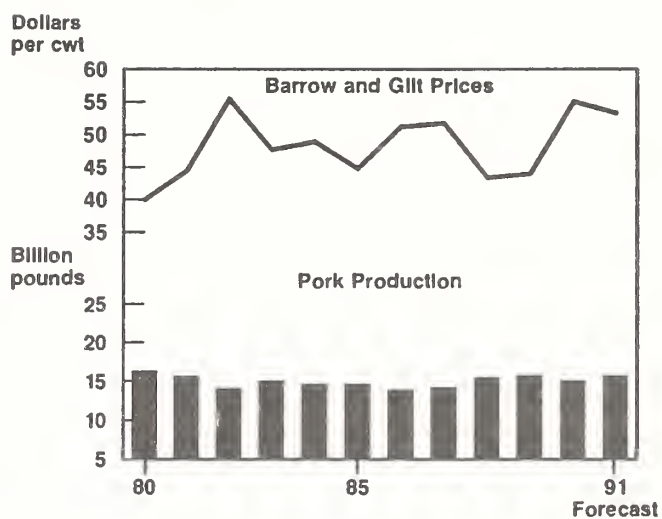


Figure 8

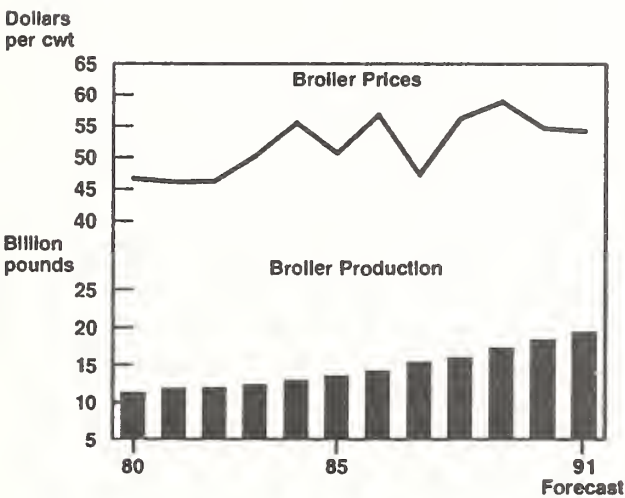


Figure 9

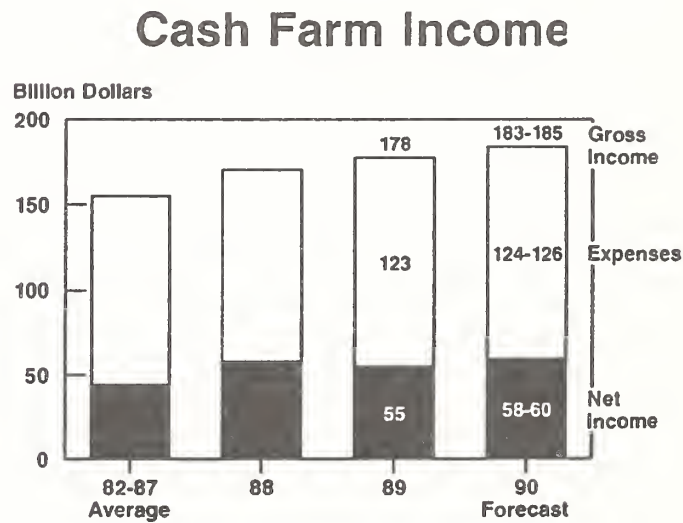


Figure 10

Poultry meat output continues to trend upward with both broilers and turkeys showing gains this year. Broiler producers continue to enjoy an unprecedented period of good returns. Broiler production will increase around 6 percent in 1990 and prices will be down 4 or 5 cents from last year's relatively high level. Production is expected to increase again in 1991 but the rate of growth probably will slow slightly (Figure 9). Prices in 1991 are expected to average near the 1990 level. Turkey producers had poor returns in the first half of 1990 but they improved during the last half as turkey prices strengthened. Production in 1990 will be up about 9 percent from the previous year. Increases in the first half of 1991 will slow from the sharp gains seen in first-half 1990. But as producers respond to the improved returns of late 1990, production in the last half of 1991 will pick up and for the year production is expected to increase 5 to 6 percent.

Egg producers have now had about 2 years of favorable returns. Producers have shown a modest response to these returns and production in 1990 will be up about 1 percent from the previous year. Egg prices in 1990 will average near the 1989 level. Production is expected to increase about 1 percent again in 1991 and prices will move lower.

### Dairy

Milk production during 1989/90 was up 1.8 percent from the previous year. Production during the first quarter of the year was down from the previous year as the result of lower cow numbers and a weak output per cow. Output per cow rebounded during the year and cow numbers moved slightly above the year-earlier level. Production during the 1990/91 is expected to increase around 2 percent as increased output per cow more than offsets a slight decrease in the number of milk cows.

After a weak performance in 1988/89, commercial use increased over 3 percent in 1989/90. Use is expected to increase around 2 percent in 1990/91. The gains in commercial use are not expected to be enough to absorb the increased milk production and CCC net removals could total about 7.5 billion pounds, milk equivalent, milkfat basis.

Milk prices rose sharply in 1989/90 with the all-milk price over \$2 per cwt above the year-earlier level during the first quarter of the year. Prices remained sharply above the year-earlier level throughout the year. In the first quarter of the 1990/91 marketing year, prices likely will average nearly \$3 per cwt lower than a year ago. Prices will continue to be down for the rest of the year.

### U.S. Farm Income and Food Prices

Larger commodity marketings will help offset increased production expenses, leaving U.S. farmers with near-record incomes. Consumers will find large commodity supplies and slower inflation, suggesting only moderately higher food prices.



## Farm Income

In 1990, net cash farm income is forecast to total a record \$59 billion (Figure 10). Marketings are up for both crops and livestock and prices will average higher for animal products. Gross cash income will be up nearly 4 percent, while the increase in cash production expenses will be held to about 2 percent by lower outlays for feed, fertilizer and interest.

In 1991, the outlook is for higher receipts but substantially bigger expenses. Marketing receipts will move up in response to bigger commodity output and higher prices for a few commodities.

Production expenses may increase 3 to 6 percent, mainly because of higher prices for energy-related inputs, particularly fuel, fertilizer and chemicals. This would suggest net cash income of \$55 to \$60 billion, slightly below the \$59 billion expected for 1990.

Net farm income of \$44 to \$49 billion would be a little below 1990's forecast record \$49 billion. Among other items, net farm income takes into account the value of commodity inventories, which is expected to increase about the same in 1991 as in 1990.

## Food Prices

Retail food prices will rise about 6 percent in 1990, slightly above gain in 1989 (Figure 11). The December 1989 Florida freeze led to much higher prices for fresh and processed fruit in 1990 and pork prices were up sharply as hog producers cut back on output.

For 1991, a food price rise of 2 to 5 percent is in prospect. Projected record meat supplies, higher dairy product output and the likelihood of bigger citrus crops this season will moderate food price rises. Too, marketing costs will increase less if overall inflation eases to around 4 1/2 percent, from 5 1/2 to 6 percent this year.

## U.S. Crop Production in 1991

There are two developments that will greatly influence crop production next year: Producer response to more planting flexibility under the 1990 farm program, and the impact of weather on crop yields.

## Acreage To Expand for Some Crops

In 1990, U.S. producers set aside from production around 60 million acres (including annual programs and CRP), very slightly below the 1989 level; but planted acreage was down 1 percent (Figure 12). Some 24 million acres were set aside under annual programs. Some of this acreage will be brought back into production next year if acreage reduction requirements (ARP's) for program participation are lowered for cotton from the 12.5 percent for 1990 and for feed grains from 1990's 10 percent. But for wheat, the ARP will be up sharply from the 5 percent in 1990, when producers also were allowed to plant up to 105 percent of their base in exchange for lower deficiency payment acres.

## Consumer Prices Percent Change

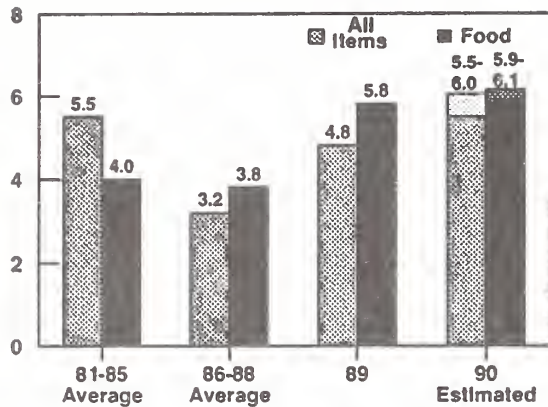


Figure 11

## Crop Area Harvested Plus Conserving Uses

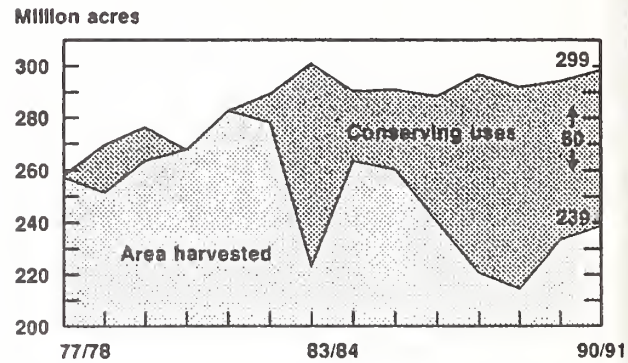


Figure 12

## U.S. Wheat and Coarse Grain Yield Index

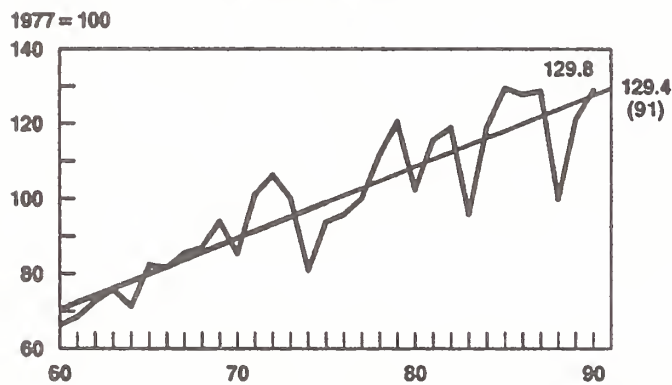


Figure 13

## Foreign Wheat and Coarse Grain Yield Index

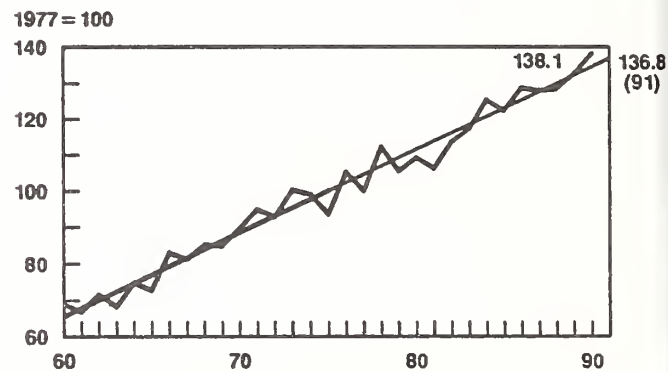


Figure 14

## Wheat and Coarse Grain Imports Share by Region, Percent

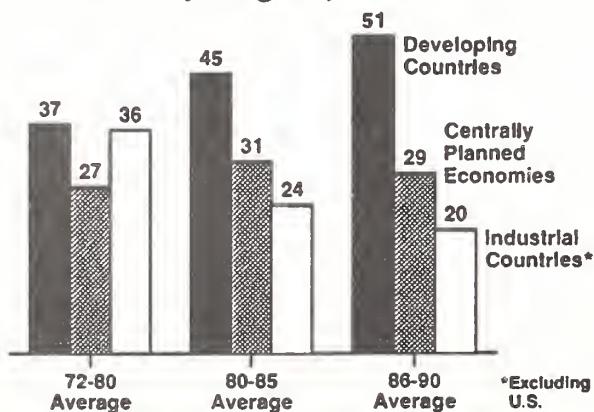


Figure 15

The "mix" of acreage planted for 1991 crops will shift in response to greater flexibility under provisions of the Food, Agriculture, Conservation and Trade Act of 1990 and the Budget Reconciliation Act. Producers will be allowed to plant a variety of crops, not including fruits and vegetables, on up to 25 percent of their crop acreage base. Soybeans, other oilseeds, and cotton are expected to effectively compete for this flexible acreage with wheat, feed grains, and rice.

#### U.S. Crop Yields To Show Little Change; Foreign To Fall

Crop yields are exceeding trend this year, reflecting improved soil moisture and favorable growing and harvesting conditions for most crops (Figure 13). Also, technology adoption and improved production practices have been adding to yields.

For the combined crops of wheat and feed grains, the trend growth in yields is about 1.5 percent per year. In the coming year, trend would suggest yields of about the same level as achieved for 1990 crops. Trend yields for the 1991 crop and less acreage, because of a reduction for wheat, would mean smaller grain production.

For other countries, weather conditions in 1990 were even more favorable than in the United States, pushing wheat and coarse grains yields 3 percent above the trend level (Figure 14). If yields increase at the trend rate in 1991, this still would be 1 percent below actual yields in 1990. Lower yields, coupled with stable acreage, would suggest a little less production next year.

#### U.S. Agricultural Exports To Grow in the 1990's

An easing of trade barriers and economic growth in the 1990's would stimulate world commodity consumption and spur trade. U.S. agricultural exports would stand to gain, since U.S. producers and marketers would be able to effectively compete in more open world markets.

#### Trends in Markets for Agricultural Products

Trends furnish a basis for analyzing past market changes and potential for future growth. Global grain trade grew only 0.1 percent per year in the 1980's, pulled down by an annual decline of 0.7 percent for the United States. Exports by other countries rose 0.8 percent per year. If we further break down foreign trade and look at combined wheat and coarse grain imports by economic regions, we find the fastest growth in developing countries. These countries account for 51 percent of imports, the largest share, and an increasing share from earlier periods in spite of debt and other financial problems (Figure 15).

In contrast, imports by foreign industrialized countries have been falling and averaged only 22 percent of global imports in the second half of the 1980's, down from 3.6 percent in the 1970's -- the European Community shifted from a major importer to a major exporter.

Imports by centrally-planned economies now average 29 percent, a slightly bigger share of the global total than the 27 in the 1970's.

#### Potential for Market Growth and U.S. Agricultural Exports

Two developments will be critical to future U.S. agricultural exports: The overall growth in agricultural trade; and the U.S. share of trade.

Among the economic regions, developing countries have shown the most growth in imports and the United States has become increasingly dependent on imports by these countries, with over one-half of U.S. exports of grains now going to developing countries. The pace of imports by these countries should increase in the 1990's, assuming trade and farm policy reforms and a resulting pickup in exports and a faster economic recovery and debt reduction. The United States would be in an excellent position to supply larger amounts of feedstuffs as these countries increase meat production.

Economic growth in centrally-planned countries will benefit from restructuring of economies. Many of these countries will strive to become more self-sufficient in production of agricultural products. About one-fifth of their total grain imports comes from the United States, slightly above earlier levels. At least over the short-term, these countries likely will need relatively large imports of agricultural products.

Industrialized countries abroad have expanded production and exports of agricultural products, while cutting back on imports. Proposed reforms would have a major impact on production and trade in grains and oilseeds by these countries. For example, in the European Community, a loosening of trade restrictions and reform of farm policies would result in larger imports by the EC and open up markets for U.S. agricultural products. Or, if Japan opened markets for imported rice, U.S. exports to that market could help increase total rice exports.

In summary, we see global trade increasing in the 1990's, stimulated by trade reform and economic growth. The United States will be in a position to take advantage of the growth in trade, aided by efficiency and reliability in both production and marketing of agricultural products.



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**AGRICULTURAL TRADE OUTLOOK**

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Administrator, Foreign Agricultural Service,  
U.S. Department of Agriculture

We are coming off a strong year for U.S. agricultural exports, a year that turned out better than we had anticipated.

Last November, when we issued our first forecast for fiscal 1990, we expected the numbers to go down slightly. Instead, they went up slightly -- the risks of the forecaster.

My predecessor in this job once quoted the famous film producer, Samuel Goldwyn: "Never make predictions, especially if they're about the future."

The economists among us would correctly point out that a forecast is not a prediction of where we will end up on any future date; it is simply a tool, with many built-in assumptions.

Basically, it uses a snapshot of current conditions that allows us to project forward to see where we might be if everything continues to go in the same direction at the same rate. That, in itself, is a risky assumption.

Let me just say that in last November's forecasts, we underestimated some of the market forces of 1990. U.S. corn prices averaged higher than we anticipated, for example, and the demand for U.S. products was stronger than expected from some countries and regions, such as Canada, the European Community, and the newly industrialized countries of East Asia.

I would be pleased, but surprised, if next year we can report the same outcome for today's forecasts.

The new trade year, fiscal 1991, began on October 1st. As we look at what has already occurred and try to peer forward, we see a number of signs that suggest moderate declines in the overall value and volume of U.S. agricultural exports this fiscal year, compared with 1990.

Within these totals, however, we can also spot some promising trade prospects -- including some possible U.S. records -- in certain commodities.

Looming largest of all, as always, are the unknowns, hidden among the twists and turns that only time will reveal. Many events have yet to occur, many decisions have yet to be made, that could significantly influence U.S. export performance in the year ahead.

The situation in the Persian Gulf comes quickly to mind, bringing with it broad questions relating to energy prices, prospects for world economic growth, and the potential for conflict in that region. Other unknowns include --

- o Import decisions by the Soviet Union and Eastern Europe, and how these decisions might be affected by offers of credit, food aid, and subsidies from various suppliers.
- o Overall import demand for bulk and high-value products in the fast-growing Asian markets -- markets where we are now working to reduce trade barriers and, in some cases, counter growing protectionist sentiment.
- o The final size of Southern Hemisphere grain and oilseed crops that are only just planted.
- o The resolution of certain bilateral trade issues, including the EC's recent import ban on U.S. pork, and the dispute over continued compensation for lost U.S. sales when Spain and Portugal entered the EC.
- o Finally, still a major unknown, is the outcome of the Uruguay Round, and possible trade reactions -- as well as policy responses -- to success or failure in these negotiations.

### **Boom, Bust, and Recovery**

Before we try to understand where U.S. exports may be going, it would be useful to briefly review where they have been.

Throughout the 1970's, the value of U.S. agricultural exports climbed to a new high each year -- every year a record. The 1980's began the same way. Then, as you know, the bottom dropped out.

Today, the records set at the beginning of the 1980's still stand unbroken, but U.S. agricultural exports have, nonetheless, made a remarkable recovery. Our exports benefited from the combination of more competitive policies, a reduction in world surpluses, growth in Asian markets, and improved macroeconomic conditions, including a lower valued dollar.

Let me point out for you what has happened since the cyclical low of fiscal 1986 --

- o In 4 years of growth, we have seen the nominal value of U.S. agricultural exports climb more than 50 percent. In fiscal 1990, the value exceeded \$40 billion for the first time since 1981. This is a symbolic benchmark, even if it does ignore inflation.

- o Over the same 4 years, we saw equally impressive growth in volume. U.S. agricultural export volume rose 40 million tons, reaching just short of 149 million tons in 1990, the largest tonnage since 1982.

### How 1991 Stacks Up

This quick review suggests that there are two questions we might ask about prospects for 1991. First, and obviously, how will 1991 stack up against 1990 for the key export sectors of U.S. agriculture? The more difficult question is this: Where does 1991 fit relative to the longer term recovery in U.S. agricultural exports?

Before we tackle either of these questions, I would like to discuss some of the conditions influencing the export outlook. As we see it, a number of events have converged to weaken markets for several commodity sectors during the year ahead.

We're facing a record world wheat crop, as well as huge supplies of coarse grains reflecting an estimated 20-million-ton increase in the world coarse grain harvest. This means increased competition in world grain markets from countries such as Canada and, this year, even China. It also means a smaller overall level of grain trade in 1990/91 as some major importers have larger domestic supplies to draw on.

The Soviet Union, for example, has harvested a record or near-record grain crop and is expected to cut total grain imports by 9 or 10 million tons from last year. At the same time, we face heavily subsidized competition from France and others for sales to the USSR, usually the top U.S. grain buyer.

World oilseed production is also forecast at a record high, as is rice production, while the global cotton harvest is expected to be the second largest ever.

These large harvests reflect unusually favorable weather in many major producing areas around the world. They are also, in part, a delayed production response by several countries to the higher grain and oilseed prices following the drought-depressed harvests of 1988/89.

Regarding the Iraqi situation, our export forecasts at this time assume no U.S. sales to this market in 1991, given the U.N. general trade embargo currently in place. In fiscal 1990, Iraq imported about a half-billion dollars worth of U.S. agricultural products before the invasion of Kuwait.

As far as the recent runup in oil prices, the trade implications are probably mixed in the short term. We anticipate some increased demand from oil exporters, and reduced demand from some oil importing nations, especially those carrying large debts.

In our favor from an export perspective, we have abundant exportable supplies of most major commodities this year, a favorable exchange rate for the U.S. dollar, and a world economy that shows continued -- though slower -- growth.

### What the Forecasts Suggest

Let me turn, now, to some of our export forecasts for 1991. I'll start with a focus on commodities, and then give you some of the country or regional highlights. Among commodities --

- o U.S. wheat shipments are expected to drop around 2 percent, following a sharp decline in 1990. The big impact, however, will be on the value side. Weak prices, combined with the lower volume, may cut the value of U.S. wheat and flour exports by around \$1.1 billion from last year's \$4.4 billion. Reduced sales to the USSR and China mainly account for this decline.

- o Our coarse grain exports -- nearly 90 percent of that corn -- are also expected to drop. Coarse grain exports jumped about 8-1/2 million tons last year, and they may drop back about 9 million tons this year, based on current forecasts. Value may be down a billion dollars from 1990's \$8 billion. Key factors are the larger global supplies, greater competition for sales, and lower projected U.S. exports to the Soviet Union.

- o In the oilseeds sector, a forecast 3-percent drop in soybean export volume will probably be offset by somewhat higher average prices and increased exports of soybean meal. Export values should remain near last year's \$3.9 billion for soybeans and \$6.25 billion for total oilseeds.

- o For cotton, we anticipate a small decline in export volume given the tight U.S. supplies. Strengthening prices are expected to result in little change in export value from 1990's \$2.7 billion.

- o On the brighter side, U.S. exports of livestock, dairy, and poultry products are forecast to reach a record \$6.9 billion. Higher prices on continued strong volume to Japan and Korea are expected to offset projected sales declines to the EC.

- o Horticultural products are also likely to set new highs, rising to a record 5 million tons valued at \$5.5 billion. Asian demand for citrus fruits, almonds, and pistachios is helping to drive this growth.

- o There is one other commodity sector I want to mention here, even though it is not included in our agricultural export totals. This is the forest products



sector. U.S. exports of forest products, ranging from logs to lumber to panel products, reached \$6.4 billion in fiscal 1990. Another record -- the fourth straight -- is expected for 1991. In contrast to our domestic situation, housing construction is booming in many Pacific Rim markets.

In Korea and Taiwan, fast-rising incomes and a large stock of substandard housing are fueling demand. Japan takes nearly half of U.S. forest product exports by value and is still a growing market, not only for logs and wood chips, but increasingly for the value-added products as well. In addition, as a result of the U.S. Super 301 case, Japan now permits wood-frame construction for multifamily housing.

Even in Europe, we're seeing continued growth, especially for the value-added products, such as lumber, plywood, panel products, and molding.

### Country and Regional Prospects

Let me shift back to our agricultural projections and turn quickly to some of the country and regional numbers in our export outlook --

- o Basically, just three nations -- the Soviet Union, Iraq, and China -- account for 85 percent of the expected decline in U.S. export value in fiscal 1991. At present, it looks like U.S. exports to the Soviet Union may drop about \$1 billion from last year's near-record \$3 billion. The primary reason for the decline to the Soviet Union is this year's large Soviet grain crop. Much of the reduced import volume will be in coarse grains, the major U.S. export to the USSR.

- o I've already mentioned our assumptions regarding Iraq. For China, a \$900-million market in 1990, we expect roughly a 30-percent decline in sales. China is harvesting a record-large grain crop, including a record wheat crop, reducing the need for wheat imports. Lower prices for a lower volume of U.S. wheat are the primary factors in the forecast decline in U.S. export value to this country.

- o Among other major markets, our 1991 forecasts suggest little overall change. Export value to Japan and the European Community may match 1990's levels. We could see some downturn from last year's record U.S. exports to the East Asian NIC's -- the newly industrialized countries of Taiwan, South Korea, Hong Kong, and Singapore. Africa looks to be down some, as well.

- o Latin America presents a somewhat improved picture, with expected increases to Mexico and Venezuela, both major oil exporters. We are also expecting another strong year for U.S. agricultural exports to Canada. Although a statistical adjustment is a primary factor in the increase of 1990 and to some extent 1991, the U.S.-Canada Free Trade Agreement is also yielding positive results in terms of increased sales.

When we put all the commodity and country numbers together, here is what we get --

- o The value of U.S. agricultural exports may drop moderately, around 4 percent or \$1.6 billion from fiscal 1990's \$40.1 billion. We anticipate a sharper drop in volume -- perhaps 6 percent to 139.5 million tons, reflecting the outlook for bulk grains.
- o If you are interested in the other side of the trade equation -- imports -- we're expecting U.S. agricultural imports to decline a half-billion dollars from 1990's record \$22.5 billion. Given these forecasts, the U.S. agricultural trade surplus would narrow about \$1.1 billion to \$16.5 billion for fiscal 1991.

### Looking Beyond 1991

Earlier, I raised a question about how 1991 prospects fit in with the 4-year export recovery we have experienced since 1986.

Our best judgment at this time is that 1991 appears to represent something of a pause in a gradual upward trend for U.S. agricultural exports. I have already outlined the factors that have converged in world markets, in this particular year, to offset some of the underlying advantages that U.S. agriculture holds.

Record world grain harvests, when they occur, will almost inevitably bite into U.S. export prospects, as long as trade barriers continue to restrain demand. In 1990, grains made up about 40 percent of total U.S. export value and three-fourths of our volume.

I think, by and large, our farmers, processors, and exporters are willing to accept, as they always have, the normal market fluctuations resulting from ups and downs in world supplies. What is more difficult to accept are the long-term risks to export growth posed by agricultural support policies around the world; the continuation and potential expansion of --

- o Protectionist barriers that retard the potential growth in world trade.
- o Unfair trade practices that distort comparative advantages.
- o And production subsidies that create artificial surpluses, which are then dumped onto world markets using export subsidies.

There is no doubt that future export gains will be more difficult and expensive to achieve without changes in the current restrictive and trade-distorting environment. It is for this reason that we, and many of our trading partners, have given so much time and attention to achieving an agreement on agricultural trade reform under the GATT.

Secretary Yeutter has already briefed you on the Uruguay Round negotiations, and where they now stand.

Let me just emphasize here that whatever happens in the Uruguay Round, we must be prepared to move forward. As the saying goes, no one gets a prize for predicting rain; just for building arks. Today, we are working, bilaterally, with countries around the world to build stronger trade relationships and reduce trade barriers.

### Where the Growth Markets Are

Here in this hemisphere, the success of the U.S.-Canada Free Trade Agreement and current talks with Mexico raise the prospect of a North American free trade zone.

We must also look to the growth markets. Policy changes in Latin America to build stronger and freer economies may well lead to renewed growth in the 1990's. President Bush has launched a new Enterprise for the Americas Initiative to help spur economic growth, development, and investment in that region. The 1990 farm bill commits agriculture to be part of that initiative.

Asia has been one of the most remarkable success stories for U.S. agricultural exports. In the last 2 years, over 40 percent of total U.S. agricultural exports, by value, have gone to Asian markets, up from about 35 percent in the mid-1980's. In recent years, 3 or 4 of our top 10 agricultural markets have been Asian markets.

Over the next 10 years, more than half the total world population growth will occur in Asia. This is also an area with some of the fastest growing, most dynamic economies -- not just Japan, but Taiwan, Korea, Singapore, Hong Kong, and even the emerging manufacturing economies of Thailand, Malaysia, and Indonesia.

Of course, here, too, we face some significant trade policy constraints and protectionist pressures that need to be overcome. We've had some important successes -- Japan, for example, is now a billion-dollar market for U.S. beef, and this coming April marks the complete phaseout of that country's beef quota. But in Japan and other countries of the region, we still have a lot of work to do in convincing them of the mutual benefits of free trade in agriculture.

I might also point to another area of growth for U.S. exports -- not a country or region, but a product grouping.

While, with some notable exceptions, the 1991 outlook is not the most encouraging for our bulk commodities, the export picture is quite different for a broad range of consumer-oriented U.S. foods. This category includes a cross-commodity mix of products ready for consumption -- fruits, vegetables, nuts, meats, juices, breakfast cereals, baked goods, and so on.

U.S. exports of consumer-oriented agricultural products are projected to set still another record this year, exceeding \$9.4 billion. Our fresh or processed ready-to-eat foods tend to benefit when the value of the U.S. dollar drops against other world currencies, as it has been doing.

This is also an area where overall world trade has been expanding most rapidly, even though these products face some of the highest trade barriers. Our estimates suggest that close to 60 percent of the total value of world agricultural trade is in consumer-oriented products.

### Conclusion

In my remarks today, I have highlighted some of the opportunities, as well as the uncertainties, in the export picture.

Clearly, our agricultural export prospects for coming years would be greatly improved by --

- o a successful conclusion to the Uruguay Round GATT trade talks.
- o a resolution to the Persian Gulf crisis and greater stability in world energy prices.
- o a return to stronger growth in the world economy.
- o a resolution of the debt problems still hampering economic growth in many developing countries.
- o the continued transition of the Soviet Union and China toward market economies, and success for the emerging democracies in Eastern Europe, Latin America, and elsewhere in overcoming the obstacles they face, so they can become full participants in the world economy.

In our own policies and our own agricultural industries, we have already taken many of the steps that were needed to better compete for agricultural markets and to capture our share of opportunities as they emerge.

We now have a new farm bill that continues the market-oriented policies begun in 1985 and increases flexibility in farmers' planting decisions to further enhance U.S. competitiveness. It will help U.S. agriculture adjust to the demands of a rapidly changing world.

Just as important, we are working hard, bilaterally and multilaterally, to change the policies and reduce the barriers that constitute the largest single restraint on future growth in world trade.

No doubt, U.S. agricultural exporters will face tough challenges in the 1990's. But, with our current farm and trade policies, the United States is in a strong position to capture gains as world markets grow in the future.

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## TRADE AND ECONOMIC PROSPECTS IN A CRUCIBLE OF CHANGE

### Moderator:

Carol Brookins, President, World Perspectives, Inc.

### Panelists:

Corrado Pirzio-Baroli, Deputy Head of the Delegation  
of the Commission of the European Communities

Maciej Kozlowski, Deputy Chief of Mission,  
Minister-Counselor, Embassy of Poland

Richard W. Rahn, Vice-President and Chief Economist  
U.S. Chamber of Commerce

Curtis W. Kamman, Deputy Assistant Secretary of State  
for the Soviet Union and Eastern Europe

MS. BROOKINS: It's delightful to be here today and to have the opportunity to chair this very important panel.

We really are in the midst of profound fundamental changes in the world's economic and political structures. In the 1980's, we saw the bankruptcy of the communist ideology and at the same time the bankruptcy of nations throughout the world, not just in Eastern Europe, that had operated centrally planned or statused economies.

The failure of communist regimes in Eastern Europe to provide people with even basic goods such as food has led us faster than we would have ever imagined just a year ago into an unprecedented process of economic and political liberalization.

This revolution in Eastern Europe is really incredible and it has many economic, political, and trade implications. It has dramatically changed the U.S.-Soviet superpower relationship with strategic consequences not only on the European continent but around the globe, as the Iraqi crisis is showing us so well.

It's enhancing the potential to further expand the trade regime of the European Community beyond today's 12 member states and 340 million people, now that East Germany has become unified with West Germany.

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\* Based on a transcript.

It can expand the reach of the European Community to the whole continent to a true European economic space and this is coming at a time when the EC itself is engaged in major new steps toward an economic, monetary, and political union.

It's calling on the industrial world to provide tremendous financial, technical, and human resources in order to assist the transition to market economies and to support young and fragile democracies in the east.

And it may provide a very important new engine of growth to the world during this decade if these countries can successfully move to market systems. Certainly as these countries improve their economic performance, we in America and in agriculture must wonder whether they will become agricultural trade competitors or bigger trading partners and markets in the years ahead.

In this regard, I think it's important to remember that the Soviet grain buying agency we know so well as Exportkleb really means "export bread," and that the Russians were grain exporters dating from the time of Catherine the Great in the 18th century.

These are only a few of the issues we're going to consider this afternoon. We are very, very privileged to have with us on this panel four experts who will share their perspectives on these profound changes.

I'd like to introduce them now in the order of their remarks. Their biographies are far more extensive than the brief introduction I will make but I think our time can better be spent listening to what they have to say.

First, Mr. Curtis Kamman, who is Deputy Assistant Secretary of State for the Soviet Union and Eastern Europe. Mr. Kamman has served in numerous critical positions in the Foreign Service, including in Moscow and in the State Department's Bureau of Intelligence and Research.

He speaks Russian and he's directly involved today operationally in developing and implementing U.S. policy for this area.

Next we have Dr. Corrado Pirzio-Baroli, who is Deputy Head of the European Delegation in Washington and has held a number of important posts with the European Community in Brussels since 1971.

His work has included the international economy and east-west relations, as well as West European integration, including relations between the European Community and the seven neutral nations of the European Free Trade Association.

Next we have Dr. Maciej Kozlowski, who is the Deputy Chief of Mission of the Embassy of Poland. Dr. Kozlowski is uniquely able to share his views on the challenges and opportunities taking place in Poland and he has a very important understanding of the transition that is taking place to democracy. In fact, he served a prison term in Poland from 1969 to 1971 for smuggling political literature into then-communist Poland.

Last but not least is Dr. Richard Rahn, who is Vice-President and Chief Economist of the United States Chamber of Commerce and Editor-in-Chief of the Chamber's Journal of Economic Growth. With

an impressive background in economic consulting, Dr. Rahn is currently actively involved in East Europe's economic transition and he has personally served in an advisory capacity to governments in Eastern Europe, including Bulgaria and Hungary.

Mr. Kamman, if you could begin?

MR. KAMMAN: Thank you very much. I've got a very short time and I was asked by Carol if I could touch on both the Soviet Union and the other countries of what we always called in the past East Europe and what we are coming now to call East Central Europe.

First, the Soviet Union. The Soviet Union has moved in the years of Gorbachev, which is now coming up on six years, from a position of a monolithic one-party dominated state to a country where political pluralism, democracy, open expression of dissent, broad political participation, and a far more responsible, sober foreign policy have all made us more hopeful and have led to a better U.S.-Soviet relationship than in any time in recent years.

Now, those are the positive sides of the equation. We have seen them manifested in the fact that there are virtually no political prisoners left in the Soviet Union; no one is in jail there for their political beliefs.

Many, many thousands of Soviet citizens are now permitted to emigrate abroad if they choose to do so. There is a free press -- it's not absolutely free -- but there is a very wide diversity of critical articles, critical opinion, in the Soviet press.

There is a law which is being carried out in practice on freedom of religion. The position of the church has been much improved and has still some distance to go, but all of the things that we found so repugnant in the past in the Soviet Union are under repair, if not yet fully renovated.

And in foreign policy, the Soviet Union has recognized for the first time since World War II that its own security interests are better served by governments on its borders by countries that are friendly but not dominated and fully controlled by the Soviet Union and that its interests are not served by a heavy military presence in Eastern Europe potentially threatening the countries of Western Europe.

The Soviet Union has, as Carol mentioned, now emerged to a place in the world arena where we are able to cooperate on a wide range of issues, most notably on the issue that is facing all of us today, the Persian Gulf.

From the very first hours of the Iraqi invasion against Kuwait, the seizure of that small country, we and the Soviet Union have proceeded on the grounds that this is an unacceptable act and we have found very strong support in all international forums from the Soviet Union.

Let me turn, therefore, to the question that is probably on the mind of Gorbachev these days and is very much also on our mind and the minds of western leaders, and that is what is happening inside the Soviet Union.

The country faces two major problems among others, but for



convenience I might say that Problem No. 1 is the breakdown of the economic system. It was recognized as Gorbachev came into office that the old system was working poorly, it was not keeping the Soviet Union competitive in the world, it was using resources very inefficiently.

The old system needed to be changed and the transition to the new system is proving to be very painful and very difficult. Nevertheless, there is a consensus now in the Soviet Union that the old system will not work any longer and the issue is how do you get to the new system, which most Soviets, most ordinary people as well as Soviet leaders, are now prepared to concede should be a free market economy. The problem is, many of them have no experience with a free market economy. Not only do they not know how to get there, they don't know where it is that they are going.

At the same time, there is a challenge in the political authority in the country greater than at any time since the Russian Revolution of 1917. This challenge arises really from two kinds of phenomena.

First of all, the Soviet Union is a country composed of very many different peoples, different nationalities, different ethnic groups, and many of them, now that the repression of old days has been eased, many of them are openly at each other's throats. They dislike each other; they have historical animosities; they are in conflict with each other. This is not in every case directed against the Russians. In many cases, it's one nationality group against another.

But this has caused a political loss of authority at the level of the central government because each republic, each ethnic group, is trying to improve its own position, very often at the expense of others.

And, secondly, there is a challenge between the levels below the central government, that is, the 15 Union Republics and even the cities, the autonomous regions, which are challenging the government because they feel they can only succeed if they take control of their own political destiny and their economic resources at their local or republic level.

And these two challenges, the animosities between ethnic groups, the rivalries between the central government and the republics, can best be seen in the recent developments where Gorbachev has sought to make progress on the economic front by reorganizing the Soviet Government, to deal with his political problems in a form that I think still has yet to be agreed, and that is to develop a new treaty of the union uniting the various republics.

There is an alternative leader who has in many ways an alternative program and that's Boris Yeltsin. He is trying to put more authority on the republic level. He is using the approach not of devising a new treaty at the central government level but rather having bilateral agreements between each of the 15 republics and only from those bilateral agreements built up by sovereign republics to reach some kind of delegation of authority to a new



central government.

So there's a tug of war going on and the outcome of this is at the moment still in dispute. It has set back most of the efforts of the Soviet Union to undertake genuine economic reform because the political battle is still going on.

Now, where will it come out? Certainly, there is some prospect that it will come out badly. At the same time, there is a brighter prospect. Gorbachev and Yeltsin, the forces that they represent, may enter into some combination or some coalition.

We are not able to forecast that. We have to be prepared in the West, and especially in the United States, to deal with whatever comes. But we recognize that so far dealing with Gorbachev has been in our interest; we propose to continue that. But we don't neglect the fact that much of the authority and power now is moving into the republics around the Soviet Union.

Well, that's a once over very lightly on the Soviet Union. Let me say a few words about Eastern and Central Europe.

This is the area where the Berlin Wall came down just a year ago. The euphoria of that event and of all the other political changes that came so rapidly in late 1989, that euphoria has definitely worn off.

What is clear is that the people of that whole region never felt comfortable with communism. They have rejected it as an alien system, an economic system, and a political system, and they are moving as quickly as they can to replace it with something else.

They have made great strides in the last year, first of all, doing the most important thing, which is forcing out the old communist regimes. They have made their break with the Soviet Union and in a way this has been encouraged by Gorbachev.

I think every country of the area is now no longer in a state of tension with the Soviet Union in terms of its political situation, but is rather seeking a new place in a broader, more united, integrated Europe.

The new governments of Eastern Europe have gained political legitimacy. They have done this really on two levels; the national level and the local level. The national level was begun in Poland. I don't want to take any time away from my Polish colleague, he may have more to say about it.

But, oddly enough, in Poland, because they were first, the job was not fully completed because the communists had entrenched themselves through the modifications in the constitution that allowed Solidarity to come to power over a year ago.

And so Poland is just now completing the process of full political legitimacy at the national level. They're going through a presidential election; you've seen the results. There will be a run-off and on December 9, we will know who the new president of Poland is, thereby completing the national leadership turnover.

And Poland as well as Czechoslovakia and Hungary have changed their leaders now not only at the national level but at the local level, and this has been crucial to get rid of the old communist "apparatus," the old bureaucrats that ran everything from local

government to local industry; they are now replaced. People have voted on candidates who are accountable to people at the local level.

Those are all very positive developments but on the other side of the equation, one of the reasons for these developments is that people have been unhappy with the economic system. They have demanded change and their expectations have been very high.

That economic change on which there is a consensus in virtually all these countries of East Central Europe is proving very difficult to put into practice. How do you privatize a country which has had state ownership of the main aspects of the economy for so many years?

Where do you get the capital? What do you do about people who claim property left over from previous forms of ownership 50 or 60 years ago? All of these are being grappled with in a situation where countries have large foreign debts, in many cases their infrastructure is run down, they just have a host of problems.

And coming on top of those problems are two special problems. Their relationship to the Soviet economy is changing; the Soviet Union cannot supply the energy needs of these countries to the degree that it did in the past. The Soviet Union is no longer the market that it once was. It cannot afford to pay hard currency and yet these countries need hard currency.

And, at the same time, there is the special problem of energy price increases and energy shortages that have occurred as a result of events in the Persian Gulf.

It is a very difficult and delicate time in East Europe. The political strength, the political maturity is there; the economic problems are what one scholar has called the "morning after." The euphoria has worn off and now those countries are grappling with the economic reality.

Thank you very much.

MS. BROOKINS: Thank you very much, Curt.

Dr. Corrado Pirzio-Baroli will give us the European Community's perspective on important developments occurring on the continent.

DR. PIRZIO-BAROLI: Thank God I'm not eurosclerotic anymore. We have had that for the last 10 years and we have got out of eurosclerosis and we are on the move again. What I will talk about in these few minutes is our priorities at the moment.

Our hands are full. We have no less than 11 priorities. You may say 'What does it mean when one speaks about 11 priorities, that overstretches the very meaning of the word priority.'

Of these priorities, four are internal and seven are external. Priority 1 is the completion of the single market, Europe '92 as some have called it, which is a centerpiece of the European Community's dynamism.

By '92, we expect freedom of movement of people, capital, goods and services. Two-thirds of the 280 measures we had devised

have already been passed. Europe '92 is already yesterday, is today, and for some parts only it is still tomorrow. Our task is emphatically not to raise barriers, to keep foreign products out. Our task is to liberalize the market in order to better stimulate growth and conquer foreign markets.

In certain respects, we are becoming a more difficult market because it will be a more competitive one, but it certainly also will be a more open market. Our growth rate has moved up from stagnation in the first half of the eighties to 3.5 percent per annum in the second half of the decade and into 1990. The EC moved from a net loss of jobs of 3 million in the first half of the eighties to a net gain of jobs of 8 million in the second half of the eighties. In recent years, our investments have achieved the highest growth rate since the sixties.

As our competitiveness increases and our regulatory framework becomes simpler, more rational, and more stable, the Community will become a better partner. As you know, the more competitive nations are always open traders whereas those who are less competitive tend to be the most protectionist.

Priority 2 is to implement the Single European Act of 1987. The Single European Act includes the Single Market Program. It would be a mistake to consider that we can implement the Single Market Program without other parts of the Single European Act which are parts of one package. These are: the achievement of great economic and social cohesion, the convergence of our economies, the strengthening of the European monetary system. (Three years ago we didn't dare to talk about European Monetary Union.) Three further components of the package are the establishment of a social dimension to the European Community, cooperation in science and technology and the establishment of a common environmental policy.

If one takes away one of these elements from the package, the Europe '92 package is dead. For example, the EC '92 package would have ground to a halt had the richer EC members not agreed early on to promote economic convergence and restructuring in the poorer EC members by making a commitment to double the structural funds of the European Community (social fund, regional fund, etc.) by the end of 1993.

In that year alone, the EC will be spending \$30 billion (in 1988 terms) between the European Investment Bank money and the structural funds spent by the Commission. That's equivalent to the annual expenditure under the Marshall Plan in current terms. However, EC assistance will not be limited to five years, but will continue after 1993.

Priority 3 is to assimilate German unity: the making of East German a full participant of the Community.

Priority 4 is to make the first phase of European monetary union a success, that is, a greater degree of coordination of our monetary policies.

Priority 5 is to conclude negotiations with the EFTA countries, establishing a European economic space extending much of the single market to them. EFTA encompasses 30 million people, as



many as the Canadians, and represents the EC's largest trading partner (more important than the United States and Japan combined.)

Priority 6 is to achieve a successful Uruguay Round of trade negotiations within the GATT; I will come back to that.

Priority 7 is to decide how best to further promote political and economic reform in the Soviet Union. The Commission is submitting a report on this in December to the heads of state. It's a very difficult exercise. It's clear that something will have to be done. The Germans have already promised food aid for this winter.

Priority 8 is to negotiate far-reaching "Europe Agreements" with the East European countries. These global trade agreements will reach beyond the present trade and economic cooperation agreements we have with the Central and East European countries, including Yugoslavia. This will notably involve free trade areas in manufactured goods, whereby we would accept to liberalize, in the first half of the decade, while they will only be required to liberalize in the second half of the decade. These agreements also will involve aid on a three- or five-year basis, if certain conditions are respected. Political cooperation is also part of the deal envisaged.

Priority 9 is to establish a well-designed policy of proximity with the Southern Mediterranean. We have 200 million Arabs at our borders, as you have 80 million Mexicans, and there will be 270 million by the year 2000. And so it's a very important thing to have a policy in that regard.

Priority 10 is to rapidly conclude the intergovernmental conference on European monetary union. We will have a central bank in 1994, I've no doubt about that. Whether everybody will participate is still open but at least 11, and probably 12 Member States will do so.

Priority 11 is to lead the intergovernmental conference on European political union, which starts in mid-December, to make a further step towards integration of our foreign policies and cooperate on security. The conference will not be the final step towards political union, however.

I wish to say a few more words on three of these priorities. One, German unity. What is happening there is good news for the international adjustment process because the world will export more to United Germany, and will import less from the United Germany. German unity will do more to equilibrate international flows than any German fiscal or monetary policy measures could have done. Hence, Germany is becoming a locomotive again and taking care of very important financial needs in the East.

The costs of unity will be very high, between \$600 billion and \$1.8 trillion dollars over the next 10 years, but they will be mostly paid by the Germans. A corollary of this is that these costs will absorb large savings and make the financing of U.S. twin deficits more difficult.

The second point is the GATT Round. Secretary Yeutter said this morning that it appears that the EC is willing to reject a new



GATT agreement in agriculture in order to protect a segment of its economy which only contributes 3 percent to GDP.

Let me say, "wait a minute," to use an American expression. The EC exports more to the world than any country does; 20 percent of world exports come from the EC. Agriculture accounts only for 7 percent of these exports. Manufactures and services account for 89 percent. There are \$300 billion of manufactures exported from the EC and \$118 billion of services exported yearly.

Do you think it would be reasonable for us to risk failure of the GATT to save 7 percent of our trade? Some might rather claim that the United States is willing to forego a GATT agreement, if it does not obtain overnight from EC agriculture everything it wants. You in the United States know very well also that reform is not something that comes easily. We are very firmly embarked on reform in the Common Agricultural Policy and have made a substantive proposal. It's a negotiable proposal as in every negotiation, provided we can agree altogether on a balanced package, notably including the so-called new sectors.

My third and last comment is on political union. It has become increasingly clear that one cannot pool economic sovereignty and keep political sovereignty intact at the national level. As public opinion in Europe demands more Europe, meaning in fact a federal-type Europe, the federal finality is being spelled out more often than in the past at a high level.

The choice in the political field is no longer between standing still and moving forward. The choice is about how to prepare the Community to meet a new range of responsibilities, including financial responsibilities, as we move into the next century.

The Member States have to decide on how they're going to round out the union. They have pledged in treaty form, the Single European Act, to establish a union. They now must decide what form of political community should be built to implement the pooling of economic and monetary sovereignties in Europe.

There are no easy answers, of course, on the political and economic front. The typical European nation state is now too big to solve small problems and too small to solve big problems.

Even continental economies like America increasingly face this dilemma that they may be too big to solve small problems and too small to solve big problems.

Unless all of us learn the lessons of sovereignty sharing, which involves give and take and a readiness to compromise, international cooperation will suffer. Without a new approach to world affairs, there will be no new world order.

Thank you very much.

MS. BROOKINS: Thank you, Dr. Pirzio-Baroli.

Dr. Kozlowski will bring us a Polish perspective. I'm sure everyone would like to hear him comment a bit on the election, but we're going to ask him more to speak on the fundamental issues that are at stake.

DR. KOZLOWSKI: When I was thinking how to present to you the situation in Poland, I looked at the New York Times today and read a big article about the situation in the Soviet Union.

I thought I had read it somewhere already. It was one year ago in Poland, and exactly the same situation: long lines for food, empty shelves, rumors of some communists hoarding food as a political tool for regaining power, rumors about the speculators, and so on.

All that we had exactly a year ago in Poland in the autumn of 1989. What do we have now in Poland, a year later? We have an election where the government loses, not because there is no food, not because there are long lines, but because farmers are angry that they cannot sell their products.

And that was the reason why the Mazowiecki government ran so badly in the election and Mazowiecki was in third place in the election two days ago. Poland now is a country where we have over-production of foodstuffs, over-production of everything, and our problem is not any longer empty shelves and talk about the emergency help in food.

But we have a problem with unemployment, we have a problem of closing down ineffective factories. So it means we have these problems which you, the United States and the Europeans had about 20 years ago when there was this deep transformation of, I would say, 19th-century style industry into modern, 20th century style.

We have to close ineffective heavy industry factories and we have to change agriculture from small farms into more effective, bigger entities which can provide food at a much lower cost. Is no longer a problem of producing foodstuffs, it's a problem of how much this food costs.

I would say that we have done enormous job during that year, that we have changed from a system of shortage to a system of abundance but, of course, this has not happened without a price. The price was very heavy. Industrial output dropped about 30 percent. Output dropped in the state-owned industries and rose in the private sector, which is still small, and of course it increased enormously in what used to be called black market but now is an unofficial economy.

Unemployment is very high. The figure is about 1 million unemployed in Poland which officially is about 7 percent of workforce. However, it is not fully valid because many of these people simply claim unemployment. Benefits are quite good, the safety net is quite good, and they would prefer to deal in this grey area of the economy; they don't want official employment.

In some places and in some segments of society, this unemployment problem is very severe. That is the most important and most painful loss: the security which was typical for a communist system. We used to joke that the government is pretending that it's paying and the workers are pretending they are working. But still, it worked somehow.

Now, no one is pretending any longer. It is very bad to wake

up from the dream where everything was a pretence to the reality where work must be work and pay must be pay. This painful awakening and feeling of insecurity is very dangerous because it might endanger this very fragile democracy Mr. Kamman was speaking about.

We've entered the democratic process, we had democratic elections for president, we'll have democratic elections for the parliament, so we will have a full-fledged democracy.

But democracy is not only elections. Democracy is also much more importantly, that kind of an understanding that when you lose, you are just losing a battle, not losing the war, and you are not destroyed; that your opponent is not to be destroyed, he is to be worked with after the election. I hope we will learn this, but it is very difficult because we have been raised up in the system where the political opponent means an enemy and an enemy was to be destroyed, not to worked with.

I hope that we will overcome these difficulties. We have already lived one year in this difficult situation with a drop in real income of about 25 percent.

There were no major social disturbances, but the election has shown that this crisis is much deeper than we hoped it would be. We hoped the crisis would not be that deep. The fact that an unknown businessman from Canada just promising to make everybody rich in one month gained 25 percent of the votes means that the crisis is deep, but I hope that we'll overcome it.

I hope that we can also show how to overcome these difficulties. I'm stressing the example of Poland not because I'm a Pole, but we're the first and we started this process and we have shown the pitfalls and the possibilities to the others. The others are sort of following our way. When I look at this Shatalin Plan, the 500-day plan in Soviet Union, I have deja vu, because it is exactly a copy of the Balcerowicz plan.

When I hear about discussion going on in Czechoslovakia while implementing privatization, I hear arguments already used in Poland.

The most important fact is that we have already crossed the threshold to a market economy where price means price. All the other countries are still waiting and are afraid of taking this step because they are afraid of the social consequences. When price means price, if you do not sell your product, you're out of the market. That's what most of the industries in the Soviet Union, in Czechoslovakia, in Hungary and other countries are afraid to do because they are not yet psychologically ready.

We have jumped into this deep water. We are trying to swim, we hope that we'll be helped, but not with emergency aid. We don't need anymore emergency aid. We need investment and cooperation. I think you are a very good audience to tell that in Poland we now have that kind of system where assistance is not what is needed, although of course, any kind of humanitarian aid is always needed in a poor country, which we are.

What we need most is a certain kind of a cooperation. We need



investment, we need the foreign enterprises coming, establishing their businesses, trying to upgrade our industry and cooperating with us so that we join smoothly into the mainstream of what I would call the Atlantic-Pacific market economy system.

We hope that we'll get that kind of cooperation and that in a couple of years we'll be able to overcome these difficulties and we may set an example of how to do it in other countries.

Of course, in the Soviet Union the situation is extremely dangerous. And not only are there economic dangers as in Poland but politically the Soviet Union is very dangerous for the whole world. A country which is destabilized and which has atomic weapons is a greater threat to security, I am afraid, than this division which is now coming out from Germany, through Poland and back to Soviet Union.

Thank you.

MS. BROOKINS: Thank you very, very much, Dr. Kozlowski.

Dr. Rahn, can you give your impression of changes in Eastern Europe, please, from your perspective?

DR. RAHN: Ladies and gentlemen, it's good to be here with you. Since I'm an economist, everybody expects me to give an economic forecast, so I'll try to get that out of the way in the next 30 seconds. Yes, indeed, we are in a recession. I predict the Administration will admit it within the month. The recession will last about three quarters which means by June or so, we should be coming out of it. It will not be a terribly deep recession; interest rates will fall somewhat. Unemployment, unfortunately, will get over 7 percent. Now let's talk about Eastern Europe.

I have been the co-chairman of the Bulgarian Economic Transition Plan and Team and also, I was an adviser to the Hungarian Blue Ribbon Commission.

Now, we all know where the Eastern European countries need to be. We understand how free market democratic capitalism works and we're all trying to assist them.

But it is much trickier than you might imagine at first glance. There are a number of conditions for economic growth, and the first is private property. Without private property, we know that people do not save and invest for the future. All the governments in Eastern Europe, and even now the Soviet Union, are trying to privatize and move towards private property. Let's just take the area of agriculture.

I'm going to focus on both Hungary and Bulgaria since those are the two countries I know best. In each of these countries, there is an agricultural party that wants the land turned back to the pre-1947/1948 owners. That is difficult because obviously, that's been at least 43 years, and many of the owners have passed away. Clear title is uncertain at best.

Yet we know it's important to privatize agriculture and in Bulgaria we feel it's necessary to get much of agriculture back in private hands before March, the beginning of the spring planting



season. If that is done, I am convinced that Bulgaria will have agricultural surpluses next year and will go back to being a food exporter rather than a modest food importer. But it is not easy to privatize these agricultural lands.

Where do the people get the money to buy land if you decide to auction it off? If you auction it off, the nomenclatura have, of course, had the advantage of being able to accumulate some wealth where the typical person has not. Is that fair? Won't that build resentment?

Well, there's an endless series of problems there. Second, you need to have standard, legal accounting systems. Most of us don't think a whole lot about little things like accounting systems but in Hungary, for instance, every plant manager could establish his own accounting system. He decided what he expended and what he capitalized.

If you set up your own accounting system, you can largely determine whether or not you make a profit or a loss just by the nature of your own accounting system. And trying to standardize accounting systems requires standardized commercial codes.

In Bulgaria, for instance, one of our team members actually went back to the original Bulgarian commercial code, which was based on the French code, read it in the original French, translated it, and brought the whole thing up-to-date. That's now being considered by the Grand National Assembly in Bulgaria.

Third, you need free markets. By free markets I mean markets where prices are determined by supply and demand rather than government. Let's assume, for instance, in a place like Sofia, Bulgaria, you have a state bread factory that produces 100,000 loaves of bread per day. The bread is sold at three cents a loaf.

If you decide that a more realistic price would be 40 cents a loaf, decontrol the price, and bring the price up to that level, the only thing you've accomplished is to reduce the standard of living.

You have not engaged in what we consider a normal market process until you have passed enough enabling laws to allow private producers of bread to emerge and compete with the state producer by making additional loaves of a higher quality.

Now, in Bulgaria, in theory private producers can go into business, but where do you get the flour, shortening, and the other ingredients, because there are still all kinds of import restrictions.

There is no foreign exchange available. One of the key things we have been focusing on is trying to get the supply side of the economy going rather than just decontrolling prices, because without the supply side or the new producers producing goods and services, you only again have reduced the standard of living of people without increasing the social well-being.

You need to have free trade and that means removing most of the barriers to export and import of services. In Bulgaria, one problem is that much of its wheat and other grain is being exported. People are upset about this. They've got restrictions

against it. Wheat is actually being smuggled out of the country at the same time there's a wheat shortage in the country. This goes back to the fact that prices make no sense. And so you really have to have price reform at the same time you remove barriers to export and import of good and services.

A realistic tax system also is essential. In Hungary, for instance, they put in a tax system with a 56-percent marginal tax rate on people earning about \$6,000 a year, a 54-percent corporate rate, a 53-percent payroll tax, a 25-percent value added tax, and all kinds of specific excise taxes.

Well, the result was that nobody was paying the taxes, particularly in the private sector. So, we've had to design totally new tax systems, ones that do not depend on having a large number of trained or highly skilled accountants, tax lawyers, and tax economists.

Of course, government spending has to be reduced and budgets have to be balanced. Losses of the state-owned operations must be reduced. All this may sound easy, but if you cut back on state-owned operations, where are the people going to go to work until you have the supply side of the economy operative?

Finally, you have to have fundamental monetary reform. The monetary systems in the Eastern European countries and the Soviet Union make no sense. The central banks have no control over the money supply.

Poland has gone the greatest distance in developing a more realistic monetary system but in Bulgaria, the central bank there has had to cover the losses of all the state-owned companies, plus the deficit of the central government. This meant that the money supply growth was outside of the control of the central bank which led to a high rate of inflation, which in turn was repressed by price controls. It's called a monetary overhang. The same thing is true in the Soviet Union.

Well, I'm running out of time. The key thing to remember is this process of economic transition is extremely interdependent. You cannot make one change without making all the changes. So many of the measures that have been practiced in some of the countries, and I see now in the Soviet Union, are halfway measures -- which is almost worse than the old system.

You can either have a command economy or you can have a market economy. But if you're in the neverland of neither, output falls. The key is to make these transitions as rapidly as possible, do a comprehensive program, do it all together, and try to minimize the period of economic pain and downturn.

I have no doubt that the countries that have the most comprehensive programs and do it the most rapidly will soon see positive rates of economic growth. For instance, in Bulgaria, I can see by the spring if they do things correctly, they could be back having positive rates of economic growth.

Unfortunately now in Bulgaria, you've got a great deal of disarray among the parliament. They do not really have an operative government because the political parties are too widely

diverse and nothing can get done at the moment. Nobody wants to accept the full responsibility for the transitional pain.

It's going to be a difficult year. I'm optimistic over the long run but I'm pessimistic in the short run. Over the long run for those of you involved in agriculture, I would expect most of the Eastern European countries again to become agriculture exporters rather than importers and that, of course, will increase worldwide competition.

Thank you.

MS. BROOKINS: Those are sobering thoughts. I'm sure there are a lot of questions from the floor, but based on what all of our panelists said, I'd like to lead off with one question: In the United States and in Europe, we have seasoned democracies and we've shown how very difficult it is for us to take tough political actions related to the budget, related to farmer supports or other preferential interests.

Are you all optimistic about the ability of new democracies in Eastern Europe to take on the very harsh and austere conditions that are going to be necessary for substantial reform, or will governments just be thrown out as people promise pie-in-the-sky to try to gain favor?

Richard, you wanted to respond first?

DR. RAHN: Well, I'll start off with Hungary and Bulgaria. I'm quite optimistic about Hungary. There's been, of course, a longer period of economic transition. The people have been much more aware of what's happening in Western Europe and the economy was nowhere near as bad shape as some of the other countries.

The Hungarians are now what I refer to as the Italian model, in all due respect to my colleague here on the panel, which I don't think of as the ideal model, but it works.

A lot of things are illegal but nothing is prohibited; hence you have spontaneous capitalism. On the streets of Budapest these days are many new restaurants and new shops. Most of them do not have a really legal basis for being established.

As I mentioned, with the ludicrous tax system they have, nobody is paying the tax. Well, that's good because then economic activity can indeed take place. If people actually paid the legislated taxes, nobody would hire anybody.

There is spontaneous capitalism; the borders are largely open; and I think that over time the Hungarian parliament and government will catch up with what the people are doing on the streets.

And, of course, you do have some private ownership of land that is expanding and I am quite optimistic about Hungary. The Bulgarian situation is much more iffy. As I mentioned, right now we have a basically dysfunctional government.

I've spent a lot of time with both the socialist and the opposition UDF party trying to get them to work on the basic economic reform. Bulgaria is naturally a rich country. It has got a huge human resource in terms of educated people, scientists,



engineers, and the potential to be agriculturally productive.

But it lacks democratic traditions. It's all new. There is enormous pain at the moment. Electricity is on 2 hours a day, off 2 hours a day. The lines for gasoline and even some food items are now at record levels and it is going to be a tough few months.

If they make it through this winter, then I think that we can look to eventually a high-growth economy in Bulgaria. But, I'm not sure they're going to make it through this winter.

MS. BROOKINS: Dr. Kozlowski, do you have some thoughts following your election as to the ability of democracy to bring about difficult economic choices?

DR. KOZLOWSKI: Well, it is difficult for me to speak because I feel like an elephant speaking about zoology. You know, because I am just getting involved in a situation without precedent. Of course, I have to be optimistic because otherwise I wouldn't be here. I would ask for political asylum here and would not be representing my country.

For my job, I have to be optimistic. I must say it is very difficult. I cannot say that the road is already straightforward and we can count for sure that things will go in the right direction. They might go in the wrong direction. I think we are just at a crossroads. The next few weeks or even days will show us in Poland in which direction the country will go. I hope that it is in the right direction. That means a stable, strong government under the new president that will try to heal all the wounds of the election campaign and will try to go the same road as the old government, and that is tough economic policy, because we know for sure there is only one way we can succeed.

The Jane Fonda axiom applies to Poland: no pain, no gain. You cannot reach a market economy without a really tough period of adjustment and the sooner the people learn it and the more government is strong showing there is no easy way, no easy solutions, the better.

But if my people choose this easy solution, with some people promising that they will bring wealth to everybody in two weeks, then I'm afraid I must be pessimistic.

MS. BROOKINS: Thank you very much.

Dr. Pirzio-Baroli, do you have some thoughts from the European perspective?

DR. PIRZIO-BAROLI: I think the answer is yes to your question. Market reform can succeed if we open our markets more, including agricultural markets, and if foreign banks have sufficient confidence to get involved, at least in Central Europe. Frankly, why should these banks have less confidence than they seemed to have in the '70s or '60s?

Didn't they then squander the money? Then, when command economies gave little hope of economic strength? Today, at least,



economic reform gives some hope of creditworthiness.

The banks' confidence is also important because it is related to private business confidence, notably in the West. It will increase if aid is provided in sufficient quantities, particularly if there's a hard winter.

I do not buy the thesis of those who say that the private sector needs to be developed, therefore, let private businesses move in without foreign aid to infrastructure. Those who say this are those who don't have money to put up. Whereas, those who say the opposite seem to have some money to put up, notably in Germany.

I think the truth lies in between. You cannot have private investment without infrastructures, without the economy's nervous system, without telecommunications, without roads, etc. Private businesses do not like to invest in a vacuum.

Democracy is a precondition of a market economy but can create problems of implementation (not only domestically but internationally.)

Let us take, for instance, the banning of hormones in beef or the Big Green initiative in California.

Suppose that one country decides by popular request to go ahead in those directions. Suppose that another country is not yet ready for it because public opinion requires more time to accept it and push for it, say in two or three or more years. How are democracies going to deal with this? Are we going to say, I'm sorry, I can't act differently because Congress or my people or we on our side are resisting? How will others respond?

In these matters there must be some understanding. I mean, when you moved ahead much more quickly on exhaust emission standards than we did, we didn't say that Fiat or others could not export here because their exhaust converters were too expensive (as we weren't producing many). We ducked until we were able to take similar measures in Europe. We were calm, we didn't retaliate. Wouldn't it have been wiser for the United States to react similarly against the hormone in Europe, rather than retaliate?

I think there needs to be some flexibility in this on similar very complex areas in the future.

MS. BROOKINS: Are we going to make it?

MR. KAMMAN: I think I ought to say something about the prospects in the Soviet Union since I pretty much agree with the comments of the other panelists on Eastern and Central Europe.

It is said that the Soviet Union at this point is still grappling with the whole idea of democracy and therefore there is some doubt that they can undertake these difficult economic changes.

That is all too true, but I think there are some positive things that sometimes are neglected. The political scientists are fond of saying there is no political culture, there's no experience for 70 years, democracy is unknown, people are basically just peasants of the 19th century variety, little better than serfs. I

think that is much too negative.

First of all, the world itself has changed a great deal and one of the big changes is the movement of knowledge, information, opinions, is much greater than ever before and the ideas that motivate us and that motivate Western Europe are ideas that have penetrated deeply into the Soviet Union through shortwave radio, through television, and nowadays through the travel of innumerable Soviet experts and professionals in the West.

Secondly, there is the idea that the Soviet Union cannot do the transition to private economy because people won't accept it. They won't work hard, they don't have, you might call it, a Protestant work ethic.

Well, that may be true, but at the same time it seems to me in the Soviet Union people are prepared to take up some new approach because they are so fed up with the old approach.

And the one thing that has happened under Gorbachev, especially in the last two years, apathy is no longer there. Everyone in the Soviet Union recognizes that they must undergo some kind of change and they are beginning to undergo real political discussions, on how should that change be done.

There is some concern over a military coup or some return to the old repressive ways. Well, I can't rule that out and there is ample precedent in Russian history for going to a tough line, to going to a repressive rule from an effort at liberalization.

But here, too, I think the people who are worried about this probably mistake something where in the military in the Soviet Union, there are many opinions, not just one opinion.

In the K.G.B., I think there are many views as to how the country can go forward and there's at least as good a chance that people will accept the necessity for economic change. What is required here is some form of national consensus and that right now I think is the major thing that is lacking.

That is not easy to achieve in any country, but I think the prospects over the short-term are somewhat uncertain. I think over the longer term, there is ample reason to believe the Soviet Union can make these difficult changes and will embark on a path that will make it really integrated with the rest of the world economy and the world political system.

MS. BROOKINS: Thank you very much, Curt.

I'd like to open up questions from the floor. It's amazing, if this had been two years ago, we would have been talking about Asia. Today we're talking about Eastern Europe.

QUESTION: I have a question for Secretary Kamman on the Soviet emigration question and whether or not the U.S. Government credits can be extended.

You were talking about thousands of people emigrating, in fact. I'm just wondering if we have the flexibility to recognize that de facto emigration and I'm wondering about who in our government approves which Soviet Government does the codifying.

I mean, if they can't decide which kind of government to have, how do we know to accept the codification and do we have any flexibility at all and who's in charge of that?

MR. KAMMAN: Well, let me try to address that in two parts. First of all, it is quite correct, as you say, that large numbers of Soviets have now been permitted to leave the country permanently and many, many more have left on temporary visas.

For the first 9 months, well over 200,000 Soviets have emigrated. Mainly, they have emigrated to Israel, which has accepted over 100,000 in that period and to Germany, which is accepting largely Soviet citizens of German origin.

There are also some Armenians, but rather few Russians because primarily they have no country that is prepared to accept them.

As you know, in our legislation, there is a requirement that for the full benefits of normal economic relations, Most Favored Nation status, a country should have free emigration or should be making satisfactory progress towards it.

Now, the practice in the Soviet Union is very good in 1990. I think we could expect little better. What concerns the Administration is the fact that this is all by administrative decision and could change overnight if you change the leader.

What we would like to see and what President Bush enunciated a year ago in Malta is that this should be written down in law and when he made that comment, there already was a draft law pending in the Supreme Soviet that would have made this process of emigration predictable and known to every Soviet citizen.

That law, after more than a year, has still not passed. Now, there are any number of possible explanations for why and I think the Soviets themselves are a bit worried about opening the floodgates or allowing a big brain drain.

But your second question is who makes the decision as to when the Soviet Government has fulfilled the conditions of our law. Well, under our system, the initiative for making that judgment goes to the President of the United States.

Implementation of full economic normalization depends on congressional approval of the trade agreement that has already been signed but not brought into force. So, I think in our system, it's going to have to be a partnership of the Administration and of the Congress.

We would feel a great deal more pleased with the state of affairs if the Soviet Government, that is, if the Soviet Parliament would adopt the law that has been under discussion now for more than one year.

We've made that point frequently to the Soviet Union. We can only wait and see if it is done before the end of the current session of the Supreme Soviet which is in the month of December.

MS. BROOKINS: May I just do a follow-up on that? A member of one of the Soviet Supreme committees involved in this did make a statement Friday publicly that he thought it would be passed in



this session. Is he someone that we want to listen to, that we should be listening to in the sense that they're raising it as a public issue now?

MR. KAMMAN: In a number of our conversations with the Soviet officials, we hear also that the prospects are fairly good, that it will be passed in this session. I think this is the view that we have heard from Foreign Minister Shevardnadze.

The problem, as I mentioned in my earlier remarks, is that the Soviet Union is facing a major governmental reorganization which is controversial and which is going to absorb the energies and debate time in the Supreme Soviet.

That doesn't rule out the prospect of passing the emigration law, but I think it has made it somewhat more difficult to predict whether the leadership of the parliament, the national leadership, and Mr. Gorbachev, will actually put the oomph behind this law to get it passed. So, I think I wouldn't really be able to give you a very good estimate right now, things are rather uncertain.

MS. BROOKINS: It's kind of like our Congress, right?

MR. KAMMAN: Exactly. It's not over till it's over.

MS. BROOKINS: Questions from the floor, please.

QUESTION: We've heard a discussion of investment and those factors which discourage investment. Is there foreign investment going on now in Eastern Europe and if so, in what sectors, and do you see some potentials for investment even if the current uncertainties are not resolved?

MS. BROOKINS: Richard Rahn, would you like to answer that, and then would you like to speak specifically to Poland?

DR. RAHN: There is some investment going into Hungary, primarily European -- very little American -- and I think there is more potential over the long run. The Europeans seem to have a longer time horizon than many Americans, they seem to be more patient, particularly the Germans, in looking at long-run investment opportunities.

In Bulgaria, there is virtually no foreign investment going in at the moment, which is rational. The country is bankrupt and until they make some policy changes, which I hope will be done in the next 60 days, they're not going to see any investment. If policy changes are made, then I think we can see a fairly high level of investment.

DR. KOZLOWSKI: Well, in Poland we have about 1,500 foreign investors already in the country, 70 percent of them are Germans, and only 13 percent are from the United States of America; we're not very happy about it.



We would like to diversify much more and we would like to have more big investors. Most of the foreign investors are small and even the bigger investors are very careful: they just start small operations. However, the first signs of some bigger investments from United States are now visible. Recently a branch of American Express opened in Warsaw. The American investment enterprise Chase is starting cable TV in Poland. Gdansk already has it, and Krakow will have it next year. Levi-Strauss has opened a factory in Plock.

Talks are going quite well with Boeing on some joint ventures with the Polish aircraft industry. Those are the main American investments right now, although Mackenzie is interested in gasification of Polish coal.

MS. BROOKINS: Dr. Pirzio-Baroli, do you have any thoughts about European investment in Eastern Europe?

DR. PIRZIO-BAROLI: Most of the EEC's investment in Eastern Europe is taking place in East Germany, if we exclude Bulgaria and Rumania.

MS. BROOKINS: Germany is the largest trading partner with all of Eastern Europe.

DR. RAHN: Well, the Austrians have been quite active, and the Italians also have been in Hungary.

MS. BROOKINS: We have a question over here, I believe.

QUESTION: I have two questions; one for Mr. Kamman and the other for Mr. Pirzio-Baroli. Some of the diagnoses suggest that, at least in the next five years or so, the Soviet Union will still be an important agricultural market.

But looking at the figures since Gorbachev took office, yields have increased substantially. Now it looks as if the problem is not one of production but only feeding Moscow, Leningrad, and the army. So we have a completely different situation. On the supply side of the agricultural sector, at least, the crumbling of the oil system has unleashed a lot of productive forces that are showing up in increased production. Will this change substantially the way the Soviet Union is operating its agricultural markets?

My question to Mr. Pirzio-Baroli is, since you are saying that the EC proposal is negotiable, what's the next step? Is the EC waiting for a counter-proposal from the Cairns group or USA?

MR. KAMMAN: Well, on the question of the Soviet Union, it would be foolhardy to say where the Soviet Union will be five years from now or even next year. But it is clear that the key judgment here, the key step that must be taken is, to unleash a productive range of incentives for the countryside and that has not been done.

There have been some very half-hearted measures to allow

people to lease land in the countryside. They have been accompanied by many restrictions on how long can they lease it, the ability to pass on land to heirs, and the ability to get fertilizers and other important inputs for agriculture.

All of these things have been so heavily restricted that only the most risk-minded Soviet citizen would be willing to go into private agriculture, and there are very few of them.

That whole system has got to be changed. And in Poland, where agriculture has been private for a long time but was still not very productive, what finally broke the back of the food supply situation is that farmers were not dependent any longer on government monopolies for everything they needed to produce and to market their produce. In the Soviet Union, both of those things have got to change.

Now, I think there is a prospect that this can be reformed. I think there inevitably will be a large part of Soviet agriculture still in state hands even five years from now. But if they could get a larger proportion of the goods that go into the immediate food needs of the population into private hands and provide the right incentives for those people, they could turn their situation around rather quickly.

Frankly, it seems to me that if they would simply undertake radical reform in agriculture, the Soviet Government could make the biggest forward advance in their economy. Such reform could have the most rapid political payoff because the population would then be satisfied that there was enough food coming onto the market.

But whether they will do it or not is really dependent on some very difficult political decisions and they haven't arrived at that point yet. So, I'm afraid I have to beg the question. I fear that the answer may be in five years they still may be major importers.

DR. PIRZIO-BAROLI: The next step in the Uruguay Round is the conference in Brussels starting on the 4th of December, where decisions must be made on the EC's stance in further GATT negotiations.

The challenge is at the beginning of the session, when we have to assess and see whether conditions are right for a larger package that includes agriculture together with other things. We are as far from an agreement on agriculture as we are on services, for instance, and in some other areas as well. If common positions cannot be reached between the 4th and the 7th, they will have to be hammered out later. But, for the moment, I see those dates as the deadline. Obviously, one has to keep the pressure up in order to achieve meaningful results.

I want to emphasize that you cannot isolate agriculture from the rest of the Uruguay Round components. Agriculture may be very important for some, but it is a very small part of the Round's subject matter and of world trade.

We are being asked to do in the agricultural area what nobody ever dared to do in the industrial area, where it is far easier in a way. Nobody has ever stated in the past 45 years that one should

abolish industrial tariffs or industrial subsidies within 10 years. If anybody had said that, he would not have been taken seriously. The difficulties of agriculture are compounded by the very different structures in Europe and in the United States, and by very different numbers: 12 million farmers in Europe, of which many are small farmers, compared to 2 million in the United States, mostly large farmers. I think the important thing for both the United States and Europe is to start moving towards agricultural reform. History goes on, and one can have further meetings on agriculture in the future in order to achieve more. The important thing is to start making some steps, and I hope that all of us can agree that this be done now.

MS. BROOKINS: Questions? Dr. Gloy?

DR. GLOY: I would like to raise two questions. You didn't explicitly address the question when you talked about assistance, whether you presumed you would focus on financial assistance or technical assistance or a kind of combination? My second question refers to the availability of limited resources in East European countries. Certainly you in East European countries face competition for very limited financial resources and have to make decisions on which areas and sectors to develop first.

You talked about development of internal markets, but what about a balanced approach that also develops external markets for your products? Is it correct to focus primarily on agriculture, considering the possibilities later of exports to markets that are certainly overcrowded, and overwhelmed by agricultural products?

MS. BROOKINS: Richard, would you like to take that?

DR. RAHN: Well, in terms of assistance, if you have the right set of policies, you don't need much in the way of governmental financial aid. During a short-term transition period, yes, you may need some food and fuel aid.

But if you have the right set of policies, you're going to attract considerable private investment over a longer run. If you have the wrong set of policies, getting considerable financial aid, as many countries around the world have shown, doesn't do you any good; you continue to live in poverty.

There is short-term technical assistance on how to build market-based institutions, how to step up a commercial banking system, how to set up various types of financial markets: a lot of nuts and bolts of running a capitalistic business as opposed to a state-owned enterprise.

A friend of mine in Hungary went from being a manager of a socialist enterprise to being the president of a privately owned firm. He had to sit down and learn about pricing. Before that, pricing was not important. He really had to learn about marketing and he did sort of a crash business school course. One thing we have focused on, particularly in Bulgaria, is setting up a real



western style business school to teach basics of finance, accounting, marketing, and so forth. I think that kind of activity is much more useful than just providing endless handouts, you know, teaching a person to fish rather than endlessly providing them with fish.

MS. BROOKINS: Dr. Pirzio-Baroli?

DR. PIRZIO-BAROLI: While I don't disagree, I don't agree completely. If I look at the history of Western Europe and the very generous effort which the United States made with the Marshall Plan, I don't think that all our policies in Western Europe were one hundred percent what they were supposed to be. And, in fact, some still are not what they are supposed to be. Nor were or are United States policies always what they should be.

If we expect the East European countries to really behave as democracies, to be democracies, we cannot avoid the effects of democracy. If democracy comes first, as it should, we must accept the consequences of democratic procedures and behavior: domestic pressures may make it impossible to achieve overnight or rapidly all economic reform objectives which Central\East European governments have adopted. So, true, there must be conditions to our aid; the recipients' policy directions must be clear; we must demand that Eastern Europe become more rapidly market oriented than Western Europe did after World War II, now that the market system has won over socialism. But, I don't think we can be perfectionists.

Which makes aid even more important. I do not believe that private investment alone can solve many problems in these countries in the initial years.

Even if one expected that, say, 90 percent of the investment must come from private sources, where will the other 10 percent come from? I think it may be very difficult to put up the money which is required, both public and private.

The United States were extremely generous in the postwar period to put up a very substantial amount of money for Western Europe, at a time when West European countries had clearly moved to democracy very clearly with their constitutional changes.

The Marshall Plan provided some \$150 billion in current values over four years (that is \$13 billion in 1950 values, adjusted for inflation and GNP, or the increased contribution capacity of the United States today). Or if you measure it in other terms, the United States provided 5 percent of the GNP of the Netherlands in four years, and provided 1.5 percent of the GNP of Germany in four years. The EC is providing similar relative amounts to the underdeveloped regions in the Community in relation to the RGNP of the relevant countries.

Now, I think that we should not, and cannot use a different reasoning for Eastern Europe. We may say we don't have the money, we may say we can't put it up, but I don't think that technical assistance alone can solve the problem; there needs to be also



financial aid, and more financial aid than we have put up. So far it's \$15 billion by the whole group of 24. That's one-tenth (in real terms) of what the United States put up in 1948-52, yet Eastern Europe is one-third of Western Europe.

So, I think we need to make a bigger effort on Eastern Europe than we have done so far and I speak of everybody, every industrialized country, when I say "we." Also, we must ask Eastern European countries to make a bigger effort to cooperate among themselves, just as the United States asked the nations of Europe, including Eastern Europe, (which didn't participate, however) to coordinate the use of American aid, and more.

This suggestion does not reflect a wish to exclude them from Europe. We don't want them to establish a separate East European Community. Rather, we want to encourage them to cooperate among themselves and also with the Soviet Union, which is a key trading partner. Money can help achieve all that -- substantial amounts of money will be required.

DR. RAHN: I want to reply to that briefly, if I might. I clearly agree that you don't have to have perfection, but the great German miracle began in 1947 after Ludwig Erhard went to price decontrol and, provided a sound currency. You had market systems and, you had private property rights in virtually all the Western European countries.

Without those basic preconditions, putting a lot of aid in isn't going to help. Foreign aid basically ought to be used as a bribe for putting the correct set of economic policies.

You take a look at the high growth economies of Southeast Asia: Singapore, Taiwan, Hong Kong, South Korea. They did not get substantial amounts of foreign aid. They did it through proper policies which guaranteed private property rights and provided very strong incentives for productive economic activity.

And until those disincentives for productive economic activity are removed in Eastern Europe, you're not going to get the kind of fundamental changes we need. Now, I tend to be an optimist and I think we can get them removed very quickly. I've already seen what's happened in Hungary; it's moving along and the others can follow suit. Aid ought to be used as sort of a crowbar to move along these necessary policy changes quicker.

MS. BROOKINS: Go ahead, Dr. Kozlowski.

DR. KOZLOWSKI: A few words. I rather agree with my partner on the left. That means, you know, we know from our bitter experience in Poland that any amount of money put into an inefficient system simply keeps the inefficient system in place; it doesn't improve anything.

But there is one area where economic assistance in pure form is needed, especially for Poland: debt service. We simply cannot service our huge debt, now about \$45 billion, and at the same time transform our economy. It is simply impossible.

And what we ask of our partners is some kind of solution to that problem: the debt which accumulated because of the bad policy of pumping money into an inefficient economy just to keep it in place.

DR. RAHN: Can I add one thing there, too? I fully agree with that. The Western nations do have a responsibility. Bulgaria has a debt of \$10.8 billion and it was western bankers and western governments who provided funds to corrupt communist regimes. Anybody who had looked at these regimes knew they had very little chance of paying it back.

I do think we have a moral obligation to help on the debt side because we are as guilty as they are -- the people who gave Zhivkov the money in Bulgaria to artificially boost consumption. The Bulgarian people should not bear that total cross now, anymore than the Polish people should bear the total cross for the loans made to the previous Communist regime.

MS. BROOKINS: If I can just ask a closing question or raise a few points in terms of what I think we've all heard today, it seems to me that there may be some different interpretation of what a market system should be between some of our European friends and some people in the United States as to the level of government involvement in the economy and the ability of the private sector to determine pricing and production of goods and services.

It also seems to me that perhaps the GATT negotiations are more important than ever now because we have a whole new group of countries that are adopting what are called market systems. How are we going to define them?

In agriculture, are we going to be moving from centrally planned economies -- essentially this is what the Uruguay Round is about -- to more open agricultural systems?

And if we're not successful, will we see all of Eastern Europe de facto swallowed up within the Common Agricultural Policy and into the European system as part of these preferences that you're discussing, Dr. Pirzio-Baroli? Will these be markets be absorbed into Western Europe, with the very preferential relationships that are there, and not open to broader open trade?

DR. PIRZIO-BAROLI: I think the second part of your question implies that the single market is a regional block closed to the outside world. I clearly disagree on that.

I do not think one can take what has happened in agriculture which, by the way, has happened in many other places, as an example of whether industrial and services markets will be closed or open. Not ironically, those who push hardest on agricultural liberalization, apart from the United States, are countries like Australia, who have a quite protectionist policy in other sectors.

It's very easy to establish a group or a coalition to push for something if its members agree on protecting sectors in which they tend to be less competitive and in opening of sectors in which they

don't fear competition.

I see the markets in Central Europe as part of a larger European single market within, say, 10 years. That is, at least, the framework within which Czechoslovakia, Hungary and Poland are working.

If we believe that establishing a single market in Western Europe cannot be done without providing substantial amounts of money to its poorest regions, because they are less able to compete, this same logic dictates supplying aid to Eastern Europe. If we in Europe do not do so, we would be in contradiction with our own approach to economic integration within the EC itself.

As to the social market economy, you made a reference to somewhat different approaches.

The Central and East Europeans are looking to Western Europe as a model which is somewhat more attractive to them than those of Japan or the United States. (The two latter ones are quite different of course.) They're looking at what I would call the German model, developed by economic minister Erhard, the famous free trader. What Erhard and implicitly Bismark before him, a right wing conservative, called the Sozialmarktwirtschaft -- i.e., the social market economy was a new concept: capitalism with a human face, capitalism with high social security payments, and protection.

This socioeconomic approach is basic in the European construction. It has nothing to do with socialism. It has to do with Christian democracy. It's part of the message of the founders of the Community, who are essentially Christian Democrats. So, I think that we will be seeing some difference in Western approaches towards Eastern Europe and in relations with Eastern Europe, but these are not serious. The Eastern Europeans will eventually join the EC, notably because the socioeconomic model is quite attractive to them as compared to the alternatives they see elsewhere. Geography also may have some importance in their choice of European model, for example just as for in North America, Mexico and Canada tend to look toward the U.S. model without renouncing their own traditions.

MS. BROOKINS: Thank you very much. I'd like to thank our distinguished panelists once again, Mr. Kamman, Dr. Pirzio-Baroli, Dr. Kozlowski, and Dr. Rahn for a very stimulating and valuable afternoon.



# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

United States Department of Agriculture  
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Outlook '91, Session #P4

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## **SCIENCE-DRIVEN SOLUTIONS TO FOOD SAFETY DILEMMAS-- A PROGRESS REPORT**

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It hardly seems possible a year has passed since Outlook Conference 1990. The last 12 months have been mind-boggling. I doubt if any of us could have predicted the changes we have seen in world economics, in politics, and in agriculture.

But, here it is--time for another Outlook Conference--time for planning ahead, using the best information available to be prepared for whatever the future holds. USDA continues to meet problems in a serious and forward-thinking manner, not trying to sweep them under the rug.

We utilize the best scientific solutions available, and seek them when they are not available. Today, I would like to provide you with a progress report, to tell you where we are in the campaign to find science-based solutions to food safety dilemmas.

First, I think we should focus on the fact that chemical use continues to be of concern to the public here in the United States and abroad. This concern continues despite the fact that scientific data simply do not support the argument that alarming levels of chemical residues are present in the food supply. There are some exceptions involving misuse, but they are few.

USDA's Food Safety and Inspection Service has compiled testing data for meat and poultry showing solid evidence that illegal chemical residues in meat and poultry are an ever-decreasing problem. The National Residue Program data in 1989 showed a 3 per 1,000 violation rate, based on analyses of 41,500 statistically selected samples taken at slaughterhouses across the country. In all, we conducted about 1.5 million analyses for 133 animal drugs and pesticides, including enforcement testing to follow up on suspected violations. Illegal residues from animal drugs, specifically antibiotics and sulfa compounds, remain a small but challenging problem.



Hormones have received widespread publicity in recent years. The Food Safety and Inspection Service's routine testing program has found no evidence of illegal residue levels of any of the three synthetic hormones for which cattle are tested.

There is also a deep undercurrent of public concern about pesticides. Last year, we looked for residues of 41 different pesticides in livestock and poultry. Only two monitoring samples exceeded the legal limits for pesticides. Even though pesticide levels have proven to be very low in meat and poultry, USDA continues to take the public's concern about this issue very seriously.

We are also working in cooperation with the Environmental Protection Agency, the Food and Drug Administration, and the States on a new program for monitoring and testing for pesticides in fruits and vegetables. It is called the Food Safety Data Initiative. Actual residue levels and potential human exposures will be determined as close to the consumption of fruits and vegetables as possible. This data will be stored in a central data base and will be implemented by four USDA agencies. They are the Agricultural Marketing Service, the National Agricultural Statistics Service, the Economic Research Service, and the Human Nutrition Information Service.

Now let's look at the dilemma of foodborne illness and what we're doing to find solutions. Although estimates of foodborne illness vary widely, all are large and relatively astounding when you consider that we have what is acknowledged to be one of the safest food supplies in the world. It is estimated that up to 81 million Americans suffer each year from some type of illness caused by bacteria in their food.

The September 1990 Journal of Food Protection reported on a study showing that foodborne illness results in substantial cost. Costs arise not just from the illness, but also to food producers and the national economy. The total cost of illnesses due to foodborne bacteria has been estimated between \$7.7 and \$8.4 billion annually in the United States.

At USDA, we take foodborne illness seriously. Years of research have already gone into finding causes and solutions for microbial contamination. Evidence abounds that proper food handling, preparation, and storage could prevent most of the illnesses that can result from conditions that encourage rapid growth of natural bacteria. USDA has developed wide-ranging and effective consumer education programs to alert food handlers in home and institutional settings.

USDA has pamphlets, training films, and programs for just about everyone--producers, processors, food handlers, those who prepare and serve food in hospitals, hotels, and homes, to name a few. Two new brochures--one about chemical residues in meat and poultry and the other with tips for consumers--are just off the presses and available in the lobby. Our popular toll-free consumer meat and poultry Hotline has

logged more than a quarter of a million telephone calls about food safety since it began in July of 1985. Just over 17,000 consumers called between November 1 and the day after Thanksgiving.

Food handling education is, however, only part of the prevention picture.

- Industry must acknowledge and accept responsibility for production, process control, and distribution of a safe product.
- Government must stay on the cutting edge of science-based regulation. We want to find science-based solutions that are good for the consumer and good for American agriculture.
- And consumers need to take responsibility for their own food safety by becoming informed, and then using all the good information available to them. They must realize the importance of proper hygiene, preparation, and food storage.

In 1987, after significant outbreaks of listeriosis, USDA's Food Safety and Inspection Service developed an internationally recognized test for this foodborne pathogen in meat and poultry. That same year, we began a tough regulatory program under which contaminated ready-to-eat products can be recalled if necessary. This has rarely happened.

The National Advisory Committee on Microbiological Criteria has been organized to assist USDA in the search for scientific solutions for foodborne illness. Made up of 25 leading experts from academia, industry, and government, the committee is nominated by professional organizations, trade associations, and consumers groups and then appointed by the Secretary of Agriculture. Recently, the committee developed specific recommendations for controlling listeria in refrigerated foods containing cooked, uncured meat or poultry products that are packaged for extended refrigerated shelf life.

In the area of aflatoxin, a toxin that is produced by molds, USDA's Food Safety and Inspection Service and Agricultural Marketing Service are working with the Food and Drug Administration, the Environmental Protection Agency, and the Government Accounting Office, to review the effectiveness of current practices that prevent aflatoxin in human food. USDA's Food Grain and Inspection Service provides aflatoxin testing services on grains for which standards are established. FGIS reports to FDA when it finds lots that are considered in excess of FDA levels for aflatoxin. FGIS continually updates its testing procedures. Its quality control branch is currently evaluating new methods that would give more accurate quantitative readings on parts of aflatoxin contamination per billion. In addition, USDA's AMS tests over 100,000 samples of nuts, mostly peanuts, for aflatoxin presence.

Salmonellosis is another foodborne illness that can be a killer, particularly when it strikes high-risk groups such as the elderly, infants, and those with chronic diseases or low immunity levels. USDA is currently using and developing scientific approaches to control one particularly virulent strain, Salmonella enteritidis. Little scientific data was available on the problem of Se in fresh, uncracked eggs when this problem emerged as a new food safety problem about 5 years ago. USDA is concentrating on commercial table-egg flocks to reduce the risk of human outbreaks of Salmonellosis from infected table eggs.

AMS regulates egg products and tested over 80,000 samples for Se in Fiscal Year 1990. Based on ongoing research and a voluntary testing program that was requested by the poultry industry, regulations were published in February of 1990 that restricted the sale of eggs from commercial producers implicated in outbreaks of Se. Implementation of the regulations is now carried out under the direction of an Se Task Force. The Task Force works closely with FDA and state public health officials to coordinate and enforce the provisions of these regulations.

The regulations also require that private and multiplier breeder flocks providing replacement for commercial egg-laying flocks be tested and found negative for Se. Working together, the poultry industry and the federal government have developed a sound program based on science that will protect the consumer and eventually solve the problem of Se. We are now working on a survey to determine how widespread Se is in the nation's poultry flocks. USDA is also supporting and conducting research on causes and control methods.

In addition to continuing food safety research, USDA maintains the most thorough food inspection food system in the world. USDA food veterinarians and food inspectors examine each animal before and after slaughter. Processed products are inspected a third time. For the past 15 years, the Food Safety and Inspection Service has been strengthening and modernizing meat and poultry inspection to focus on hazards to public health. During the next two years, FSIS and AMS will focus their attention on a new system to give consumers an even greater assurance of safety. The Departments of Defense, Health and Human Services, and Commerce are also zooming in on this approach.

The system, called the Hazard Analysis and Critical Control Point (or "HACCP") system, is based on prevention. Prevention means looking at critical control points throughout production. The HACCP system enables problems to be prevented very early in the food production process instead of being identified at the end of the production line. Work is now underway on how to best incorporate HACCP principles for raw products. For example, FSIS, in cooperation with the Agricultural Research Service, is currently conducting a study in a Puerto Rico poultry processing plant to determine where bacterial risks to consumers might be prevented. AMS is developing a similar project.



Realistically, we know that producers and processors can minimize, but cannot eliminate, pathogens on raw foods. But, we are certainly trying to eradicate pathogens by using science as a guide. A working group on raw products within the National Advisory Committee for Meat and Poultry is developing a HACCP plan for beef, pork, lamb, and poultry, including broilers and turkeys. The committee is looking at the entire route travelled by a raw product, from farm to table. They are also developing recommendations for safe preparation for use by hotels, restaurants, and institutional food providers.

Another food safety issue is food labeling. This is particularly timely now because food safety standards and labeling requirements based on scientific data are specifically addressed in the GATT, the Free Trade Agreement with Canada, and the agreement with Mexico.

Food safety barriers are difficult to challenge because, under a specific provision in the existing GATT agreement, a country can claim virtually any restriction is necessary to protect the health of its citizens. The U. S. proposal to the Uruguay Round would remove this loophole by requiring that such claims be based on scientific data and be presented to panels that would serve as the initial reference point for verifiable scientific information.

The December deadline for the GATT talks in Brussels is critical for many reasons, including scientific-based approaches to food safety. USDA views these international health considerations and the prevention of plant and animal diseases as an important part of solutions to food safety problems.

The bottom line in the search for science driven solutions to food safety dilemmas is that every American and every consumer of American agricultural products is entitled to two things. Those are, number one---a safe food supply, and number two---an abundant one. USDA agencies are committed to making sure those two goals are real to the public we serve.

USDA is committed to combining resources to conduct research and to maintain regulatory programs that will ensure chemical and microbiological food safety for the American consumer and our consumers abroad.

Thank you.



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## **Scientific Solutions to Food Safety Dilemmas: A Progress Report**

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THEODORE ROOSEVELT ONCE SAID, "WHENEVER YOU ARE ASKED IF YOU CAN DO A JOB, TELL'EM, 'CERTAINLY I CAN!'---AND THEN GET BUSY AND FIND OUT HOW TO DO IT." TWENTY YEARS AGO THE AMERICAN PUBLIC ASKED THE ENVIRONMENTAL PROTECTION AGENCY IF IT COULD DO THE JOB OF PROTECTING THE ENVIRONMENT. EPA HAS ANSWERED, CERTAINLY WE CAN.

SINCE ITS BEGINNINGS TWO DECADES AGO, THE ENVIRONMENTAL PROTECTION AGENCY HAS PROGRESSED IN ITS ASSIGNMENT OF PROTECTING THE ENVIRONMENT. AS WE ENTER THE 1990'S THE AGENCY FINDS ITSELF CONFRONTED WITH MANY NEW AND COMPLEX ISSUES, NONE MORE IMPORTANT, MORE COMPLEX, OR MORE CONTROVERSIAL THAN THAT OF FOOD SAFETY.

WITH THAT IN MIND, I WOULD LIKE TO DISCUSS THE PROGRESSIVE ACTION UNDERWAY AT EPA TO PROTECT OUR FOOD SUPPLY.

I HAVE OBSERVED THAT AMERICAN FOOD SAFETY-- CLEARLY CLOSE TO THE TOP OF THE NATIONAL POLICY AGENDA--BECOMES EVEN MORE COMPLEX WHEN CONSIDERED IN THE CONTEXT OF THE WORLD ECONOMY AND INTERNATIONAL RELATIONS. IMAGINE IF YOU WILL A PRISM, WHEN EACH TIME IT IS TURNED ANOTHER ANGLE IS DISCOVERED, ANOTHER SET OF COLORS IS DISPLAYED -- ENDLESSLY COMPLEX JUST AS ISSUES REVOLVING AROUND THE SAFETY OF THE AMERICAN FOOD SUPPLY HAVE A NUMBER OF DIFFERENT ANGLES AND DIMENSIONS.

THE LATEST TURN OF THE FOOD SAFETY PRISM REVEALS THE INTERNATIONAL ANGLE, ONE THAT DISPLAYS AT LEAST TWO DIMENSIONS. FIRST, WE MUST ENSURE THE SAFETY OF OUR OWN FOOD SUPPLY AND WORK TO MAKE CERTAIN THAT IMPORTED FOOD COMPLIES WITH U.S. LAWS. THIS IS PARTICULARLY URGENT AS WE ENCOURAGE OTHER COUNTRIES TO INCREASE AGRICULTURAL TRADE WITH THE U.S., TO GIVE US A MORE VARIED FOOD SUPPLY AND TO IMPROVE THE ECONOMIC CONDITIONS OF LESS DEVELOPED COUNTRIES.

AND SECONDLY, AS WE PURSUE INCREASED TRADE FROM THE U.S. GROWERS TO OTHER COUNTRIES AND OPEN UP MARKETS FOR THE ABUNDANCE OF CROPS GROWN IN THE U.S, WE MUST BE SURE HEALTH STANDARDS ARE NOT USED AS ARTIFICIAL TRADE BARRIERS.

\* CIRCLE OF POISON

THE FIRST DIMENSION OF THE FOOD SAFETY ISSUE IS CAPTURED IN THE DEBATES OVER THE "CIRCLE OF POISON". THE PERCEPTION IS WIDESPREAD THAT VAST QUANTITIES OF PESTICIDES BANNED FOR USE IN THE U.S. ARE EXPORTED TO DEVELOPING COUNTRIES, AND SUBSEQUENTLY ARE RETURNED TO THE U.S. IN THE FORM OF ILLEGAL RESIDUES ON IMPORTED FOODS. THIS THREAT HAS BEEN CHARACTERIZED AS A "CIRCLE OF POISON".

THERE IS A MOVEMENT TO STRENGTHEN BOTH THE LAW AND OUR POLICIES ON PESTICIDE EXPORTS. AS AN EXAMPLE OF THIS MOVEMENT, PESTICIDE EXPORT RESTRICTIONS WERE INCLUDED IN BOTH THE HOUSE AND SENATE FARM BILLS BEFORE BEING DELETED IN CONFERENCE COMMITTEE, AND IN ALL LIKELIHOOD WILL RETURN NEXT YEAR IN THE CONTEXT OF FIFRA REAUTHORIZATION.

BUT WHEN WE LOOK AT THIS PROBLEM CLOSELY, JUST HOW BIG IS IT? THE DATA WE HAVE AVAILABLE FROM THE FOOD AND DRUG ADMINISTRATION'S PESTICIDE MONITORING PROGRAM INDICATES THAT THE QUALITY OF IMPORTED FOODS IS NOT MUCH DIFFERENT FROM DOMESTIC FOODS. AND BOTH ARE OVERWHELMINGLY IN COMPLIANCE WITH U.S. TOLERANCES.

FDA'S MOST RECENT REPORT ON PESTICIDE RESIDUES IN FOOD (1989) NOTES THAT ONLY 1% OF THE DOMESTIC AND 3 1/2% OF THE IMPORT SURVEILLANCE SAMPLES CONTAINED VIOLATIVE PESTICIDE RESIDUES. A RECENT REPORT BY THE GENERAL ACCOUNTING OFFICE CORROBORATES THE FDA'S FINDINGS. DESPITE THE FACT THAT THE PROBLEM DOES NOT APPEAR TO POSE SIGNIFICANT RISK TO THE AMERICAN CONSUMER, EPA BELIEVES THAT THE PERCEPTION OF A "CIRCLE OF POISON" IS POWERFUL AND MUST BE ADDRESSED.

WE BEGIN BY LOOKING AT WHAT MUST BE DONE TO PROTECT THE SAFETY OF THE U.S. FOOD SUPPLY. FIRST EPA, TOGETHER WITH THE FDA AND USDA, IS TAKING STEPS TO IMPROVE COMPLIANCE OF IMPORTED FOODS WITH U.S. REGULATIONS. FDA HAS INCREASED ITS MONITORING OF IMPORTED FOODS AND IS GATHERING INFORMATION ABOUT THE USE OF PESTICIDES IN OTHER COUNTRIES.

SECOND, WE NEED TO MOVE BEYOND OUR BORDERS TO WORK WITH THE COUNTRIES FROM WHICH WE IMPORT FOOD. AT EPA, WE ARE EXPANDING OUR INTERNATIONAL PROGRAM TO ASSIST FOREIGN COUNTRIES, ESPECIALLY DEVELOPING COUNTRIES, IN UNDERSTANDING U.S. REGULATIONS GOVERNING PESTICIDE USE AND RESIDUES IN FOOD. EPA IS COMMITTED TO PROVIDING INFORMATION TO OTHER COUNTRIES IN THE FORM OF WORKSHOPS, EDUCATIONAL MATERIALS AND TECHNICAL ADVICE THAT WILL HELP THEM UNDERSTAND U.S. REGULATIONS. EPA HAS ALSO PROPOSED TO EXPAND OUR INTERNATIONAL NOTIFICATION SYSTEM. WE INTEND TO NOTIFY OTHER COUNTRIES ABOUT OUR REGULATORY ACTIONS MORE OFTEN, AND MORE EFFICIENTLY. THIS WILL KEEP COUNTRIES ABREAST OF THE LATEST HEALTH AND SAFETY INFORMATION ON PESTICIDES AND THE WAYS IN WHICH EPA IS CONTROLLING RISKS.

ALL OF THIS WORK IS BASED ON THE PREMISE THAT EXPANDED INFORMATION EXCHANGE AND UNDERSTANDING OF OUR REGULATIONS WILL ENABLE COUNTRIES TO COMPLY WITH OUR REQUIREMENTS. THE IMPORTANT ADDED BENEFIT IS THAT THEY WILL BE ABLE TO PROTECT THEIR OWN ENVIRONMENT AND CITIZENS, AS WELL.



DOES THIS MEAN THAT WE BELIEVE THAT THE CURRENT LAWS AND PAST POLICIES ON EXPORT OF DANGEROUS PESTICIDES ARE ADEQUATE? THE ANSWER IS AN EMPHATIC NO! WE ARE COMMITTED TO CHANGING OUR POLICIES AND STRENGTHENING EXISTING LAWS GOVERNING PESTICIDE EXPORTS. WE MUST MAKE IT ILLEGAL TO EXPORT PESTICIDES THAT ARE BANNED OR RESTRICTED IN THE U.S.---AND WE SUPPORT LEGISLATION TO DO THAT. FURTHER, EPA SUPPORTS AND WILL PARTICIPATE IN A SYSTEM DEVELOPED THROUGH THE UNITED NATIONS THAT WILL PROVIDE IMPORTING COUNTRIES HEALTH AND SAFETY INFORMATION TO ASSIST THEM IN MAKING THEIR OWN DECISIONS ABOUT PESTICIDES. IT FREES THEM FROM DEPENDING SOLELY UPON EPA REGULATORY DECISIONS WHICH ARE BASED ON RISK / BENEFIT CRITERIA SPECIFIC TO THE U.S. AND WHICH MAY DIFFER IN OTHER COUNTRIES.

\* THE GATT NEGOTIATIONS

I WANT TO TURN NOW TO THE SECOND DIMENSION OF THE INTERNATIONAL FOOD SAFETY ISSUE -- GROWING CONCERN THAT ENVIRONMENTAL AND HEALTH STANDARDS ARE BEING USED AS ARTIFICIAL TRADE BARRIERS. WE MUST DEVELOP A SYSTEM WHERE LEGITIMATE STANDARDS DESIGNED TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT CAN BE DISTINGUISHED FROM THOSE DESIGNED MERELY AS PROTECTIONIST MEASURES. NEGOTIATIONS WILL SOON CONCLUDE WITHIN THE FRAMEWORK OF THE GENERAL AGREEMENT OF TARIFFS AND TRADE, OR (GATT), TO ENSURE THAT HEALTH AND SAFETY REGULATIONS ARE JUST THAT, AND NOT TRADE BARRIERS IN DISGUISE. TO DO THIS, WE MUST AGREE UPON PROCEDURES FOR THE RESOLUTION OF DISPUTES THAT OCCUR WHEN TWO COUNTRIES COME TO DIFFERENT CONCLUSIONS ABOUT WHAT PESTICIDES TO USE, ON WHAT CROPS AND IN WHAT QUANTITIES. AT THE CORE OF THE DEBATE MUST BE SOUND SCIENCE. OUR SYSTEM OF REVIEWING PESTICIDES IS A LONG AND COMPLEX ONE, PERHAPS TOO MUCH SO. BUT IT IS BASED ON CONSIDERABLE SCIENTIFIC RESEARCH AND SOUND DATA. OUR POLICY DECISIONS ON RISK AND BENEFITS ARE MADE IN A PUBLIC PROCESS AND THEY APPLY ACROSS THE BOARD TO ALL FOOD -- DOMESTICALLY GROWN OR IMPORTED IN THE U.S.



IN SOME COUNTRIES, FOR SOME STANDARDS, THIS IS NOT THE CASE AND AMERICAN FARMERS GET HURT. HOPEFULLY, THE GATT PROCESS WILL PROVIDE A MEANS FOR DISTINGUISHING BETWEEN THE TWO. MY OBJECTIVE IN SUPPORTING THESE NEGOTIATIONS IS TO PROTECT THE AMERICAN CONSUMER AND ASSURE THAT IMPORTED FOOD CONTINUES TO BE HELD TO THE SAME HIGH STANDARD AS DOMESTICALLY PRODUCED FOOD. TO THAT SAME END, I WANT TO MAKE SURE THAT THE GATT ALLOWS OUR REGULATORY SYSTEM TIME TO OPERATE, SO THAT WE CAN PERFORM A SCIENCE-BASED REVIEW BEFORE ALLOWING ACCESS TO PRODUCTS WITH PESTICIDE RESIDUES. I ALSO WANT TO BE SURE THE AMERICAN FARMER IS BEING TREATED FAIRLY. IT DOES NOT IMPROVE THE GLOBAL ENVIRONMENT, OR ADD ANY HEALTH PROTECTION WHATSOEVER FOR PESTICIDE STANDARDS TO BE ARTIFICIALLY DEVELOPED OR APPLIED IN A DISCRIMINATORY FASHION, FOR NO PURPOSE OTHER THAN TO AFFECT TRADE.

THE RESOLUTION OF THE ISSUES IN THE GATT IS SIMPLY A MEANS TO AN END. AS I SEE IT, THE END WE ARE TRYING TO ACHIEVE IS A UNIVERSAL RECOGNITION OF QUALITY SCIENCE AND PROTECTION OF HUMAN HEALTH. IN THE LONG RUN, RELYING ON QUALITY SCIENCE SHOULD LEAD TOWARD GREATER CONSISTENCY OR HARMONIZATION OF PESTICIDE TOLERANCES AND OTHER HEALTH AND SAFETY STANDARDS THROUGHOUT THE WORLD.

\* THE PRESIDENT'S FOOD SAFETY PLAN

WHEN CONSIDERING ALL OF THE ASPECTS OF INTERNATIONAL FOOD SAFETY ISSUES, IT MUST BE KEPT IN MIND THAT FOOD SAFETY IS FIRST AND FOREMOST AN ISSUE OF HOW PESTICIDES ARE USED AND REGULATED IN THE UNITED STATES. THUS, I WANT TO DISCUSS THE STEPS PRESIDENT BUSH'S ADMINISTRATION BELIEVES NECESSARY TO ENHANCE FOOD SAFETY BY IMPROVING THE U.S. GOVERNMENT'S ABILITY TO REGULATE PESTICIDES. ALTHOUGH THE UNITED STATES HAS ONE OF THE SAFEST FOOD SUPPLIES IN THE WORLD, IT CAN BE MADE SAFER AND I WANT TO TALK ABOUT THE WAY WE PLAN TO ACHIEVE THAT.

WE NEED CHANGES IN OUR PESTICIDE LAWS TO IMPROVE OUR ABILITY TO PROTECT THE FOOD SUPPLY. OUR PESTICIDE LAWS ARE ARCAIC AND ANTIQUATED. THE PRESIDENT'S FOOD SAFETY PLAN IS A COMPREHENSIVE PACKAGE OF REFORMS WHICH WILL GREATLY ENHANCE OUR AUTHORITIES. LET ME HIGHLIGHT SOME OF THE IMPORTANT ELEMENTS OF THE PRESIDENT'S PLAN.

FIRST, THE PLAN PROVIDES EPA WITH GREATER FLEXIBILITY TO USE ITS SUSPENSION AUTHORITY MORE EFFECTIVELY. WHEN SERIOUS QUESTIONS ARISE ABOUT A PESTICIDE, THE AGENCY MUST BE ABLE TO MOVE QUICKLY. CONSUMERS SHOULD NOT BEAR THE POTENTIAL RISKS FROM CONTINUED USE OF THE PESTICIDE WHILE DETAILED REVIEW OF RISKS AND BENEFITS PROCEEDS THROUGH THE CANCELLATION PROCESS.

SECOND, THE PRESIDENT'S PROPOSAL SIMPLIFIES THE CANCELLATION PROCESS, THE FORMAL PROCESS BY WHICH WE REMOVE A PESTICIDE FROM THE MARKET. THE TIME REQUIRED FOR CANCELLATION PROCEEDINGS IS ENTIRELY TOO LONG, LASTING FROM FOUR TO EIGHT YEARS.

THE PRESIDENT'S PLAN WILL REDUCE THIS TIME BY ELIMINATING THE FORMAL ADJUDICATORY HEARING AND SUBSTITUTING A NOTICE AND COMMENT PROCEDURE. AN INFORMAL HEARING MAY BE HELD DURING THE COMMENT PERIOD, AND THE FINAL ORDER WOULD STILL BE SUBJECT TO JUDICIAL REVIEW. THE PLAN SPECIFIES THAT EPA MUST CONSULT WITH U.S.D.A. AND H.H.S. BEFORE TAKING ACTION ON A PESTICIDE.

THIRD, THE PROPOSAL ESTABLISHES AN OBLIGATION ON REGISTRANTS FOR PERIODIC REVIEW TO HELP ENSURE THAT ALL PESTICIDE REGISTRATIONS ARE KEPT UP TO DATE WITH THE LATEST SCIENTIFIC STANDARDS. RATHER THAN PLAYING CATCH-UP, AS WE ARE DOING WITH THE (FIFRA) 88 REREGISTRATION PROGRAM, WE SHOULD INSTITUTIONALIZE THE PRINCIPLE OF REVISITING REGISTRATIONS ON A REGULAR BASIS SO THAT WE NEVER FACE ANOTHER GENERATION OF INADEQUATELY TESTED PESTICIDES THAT REQUIRES DRASTIC, MASSIVE EFFORTS TO REREGISTER.

FOURTH, THE PLAN ENHANCES ENFORCEMENT AUTHORITIES UNDER FIFRA BY PROVIDING TOUGHER PENALTIES AND INCREASED RECORD KEEPING REQUIREMENTS; THIS REALLY AMOUNTS TO BRINGING FIFRA INTO LINE WITH OTHER ENVIRONMENTAL LAWS. WE VIEW IMPROVED ENFORCEMENT AS ESSENTIAL TO THE CREDIBILITY OF THE PESTICIDE REGULATORY SYSTEM.

FIFTH, THE PRESIDENT'S PLAN PROPOSES TO ELIMINATE THE LONG-STANDING INCONSISTENCY IN THE FEDERAL FOOD, DRUG AND COSMETIC ACT WHICH GOVERNS LEGAL TOLERANCES FOR PESTICIDE RESIDUES IN FOODS. THE PRESIDENT'S PLAN ADOPTS A RECOMMENDATION OF THE NATIONAL ACADEMY OF SCIENCES TO ELIMINATE THE SO-CALLED DELANEY CLAUSE, WHICH APPLIED ONLY TO CERTAIN PROCESSED FOODS, AND TO ESTABLISH A CONSISTENT "NEGLIGIBLE RISK" STANDARD FOR PESTICIDE RESIDUES IN BOTH RAW AND PROCESSED FOODS.

AND LASTLY, THE PLAN WOULD ESTABLISH BY STATUTE, NATIONAL UNIFORMITY FOR TOLERANCES THAT ARE SET PROSPECTIVELY AS A RESULT OF EPA'S FIFRA 88 REREGISTRATION REVIEW AND FOR NEW PESTICIDE TOLERANCES. STATES COULD OBTAIN WAIVERS IF SPECIAL LOCAL CIRCUMSTANCES WARRANT.

ALTHOUGH CONGRESS FAILED TO PASS FOOD SAFETY LEGISLATION LAST YEAR, I LOOK FORWARD TO WORKING WITH THEM NEXT YEAR TO ACHIEVE THAT GOAL.

IN ADDITION TO LEGISLATION REFORM AND INTERNATIONAL NEGOTIATIONS, WE ARE WORKING ON A NUMBER OF WAYS TO OPEN UP OUR DECISION-MAKING PROCESS AT EPA, SO THAT THE PUBLIC CAN UNDERSTAND WHAT WE ARE DOING ABOUT PARTICULAR PESTICIDES AND WHY WE ARE DOING IT. TRADITIONALLY, PESTICIDE REGULATORY DECISIONS WERE HANDLED LARGELY BETWEEN EPA AND THE CHEMICAL COMPANY. WE INTEND TO OPEN UP OUR DECISION-MAKING PROCESS TO MORE PEOPLE WHO ARE AFFECTED BY OUR DECISIONS- PARTICULARLY - THE FARM COMMUNITY, AND CONSUMERS.



FARMERS NEED TO KNOW WHEN A CHEMICAL MAY BE IN TROUBLE AND PLAN ACCORDINGLY. THEY MUST IDENTIFY WAYS TO REDUCE EXPOSURE THROUGH LOWER APPLICATION RATES, LONGER PRE-HARVEST INTERVALS - OR BEGIN TO FIND ALTERNATIVES.

WE NEED TO HAVE THIS INPUT AND PARTICIPATION -- AND WE NEED IT EARLY ON IN THE PROCESS. IT DOES NOT HELP TO FIND OUT WHAT THE PUBLIC WANTS ON MONDAY MORNING AFTER THE DECISIONS WERE MADE ON FRIDAY NIGHT.

WE ARE DEVELOPING A COMPUTERIZED DATA TRACKING SYSTEM TO KEEP INTERESTED PARTIES INFORMED ABOUT THE STATUS OF OUR CHEMICAL REVIEWS. WE WILL ALERT EVERYONE, THE REGISTRANTS, USERS, STATES, CONGRESS AND THE PUBLIC TO WHAT WE ARE DOING. INTERESTED PARTIES CAN FOLLOW THE PROGRESS OF PESTICIDES THROUGH OUR REREGISTRATION SYSTEM.

WE HAVE ALREADY BEGUN WORKING MORE CLOSELY WITH FDA, USDA, AND THE STATES IN THEIR FOOD MONITORING PROGRAMS -- SO THAT WE CAN GET GOOD RESIDUE DATA ON PESTICIDES OF CONCERN.

FINALLY, WE AT EPA ARE DETERMINED TO BECOME BETTER RISK COMMUNICATORS. WE ARE BECOMING MORE PRO-ACTIVE IN EXPLAINING OUR PROGRAMS AND THE ISSUES AT STAKE IN THEM; MORE CANDID ABOUT RISKS AND THE UNCERTAINTIES WE SOMETIMES ENCOUNTER; AS WELL AS THE BENEFITS OF USING CHEMICALS. WE MUST INFORM THE PUBLIC OF WHAT IS BEING DONE TO REDUCE UNNECESSARY EXPOSURE AND WE MUST BE CERTAIN TO TREAT THE PUBLIC WITH RESPECT AND OPENNESS AND RECOGNIZE THEIR ROLE IN THE PROCESS.



TODAY, I HAVE BRIEFLY TOUCHED UPON SOME AREAS WHERE THE ENVIRONMENTAL PROTECTION AGENCY AND THE BUSH ADMINISTRATION ARE TAKING PROGRESSIVE STEPS TO ENSURE THE PROPER PROTECTION OF OUR FOOD SUPPLY. AS ONE OF THE GOVERNMENTAL AGENCIES WHICH HAS BEEN CHARGED WITH THE RESPONSIBILITY OF CONTINUING AND IMPROVING UPON THE PROTECTION OF OUR FOOD SUPPLY, WE MUST ALWAYS BE ABLE TO ANSWER YES TO THE QUESTION OF CAN WE DO THE JOB. WITH IMPLEMENTATION OF THE PRESIDENT'S FOOD SAFETY PLAN, I BELIEVE THAT WE CAN NOT ONLY CONTINUE TO ANSWER YES TO THAT IMPORTANT QUESTION, BUT WE CAN IMPROVE UPON OUR ACCOMPLISHMENTS AS WELL.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
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## CONSUMER PERCEPTIONS ON SCIENTIFIC SOLUTIONS TO FOOD SAFETY & ENVIRONMENTAL DILEMMAS.

Delia A. Hammock, M.S., R.D.  
Associate Director, Good Housekeeping Institute

Food safety and environmental issues are of particular concern to women. This fact is certainly not surprising. After all, women are still the chief shoppers, preparers and servers of food and they generally carry the responsibility for feeding themselves and their families safely and nutritiously.

Food safety considerations have become an integral part of buying decisions. In fact, in a survey conducted in April/May of 1990 by the Consumer Research Department of the Good Housekeeping Institute, safety was named as the most important consideration when shopping for food. Almost 40 percent of the respondents said they no longer take the safety of foods for granted, but feel they must check everything they buy.

Concern about the environment is also increasing. When Good Housekeeping asked 1200 women what they felt were the three most important problems facing the United States today, the environment was second only to drugs in its frequency of mention.

In many instances, food safety is coming under the umbrella of the environmental movement. We are rapidly moving from a demand for "safe" food, to a demand for "clean" food. However, the definition of clean food is open to wide interpretation. For many it is the food in local supermarkets. For some, it is food with no detectable pesticide residues. Still others demand food grown without pesticides. Any food that contains additives or preservatives is not considered clean by some individuals, while others eliminate meat, or any foods containing animal products as well.

The common thread that runs among all of these definitions of clean food, however, is the fear of chemicals--a fear that seems to be growing. In a 1985 Institute survey, consumers were asked if they thought that chemicals were ever "good for you." Eighty-one percent said "yes." But in a 1990 survey, only 59 percent gave a positive response to the question.

Furthermore, one out of two consumers said that the smallness of the amount of a potentially unsafe ingredient does not reduce the fear of that ingredient.

Consumers fear chemicals because they associate them with another powerful fear--the fear of the unknown. They are afraid that chemicals that are thought to be safe today will be found to have terrible consequences years later. They also strongly associate chemicals with cancer.

This fear of chemicals is revealed in many ways. For example, surveys show that consumers most commonly use ingredient labels on packaged foods to cut "bad" things out of their diets. Most often rejected are ingredients with chemical-sounding names such as additives and preservatives. But ingredient labeling does allow the consumer to make a choice, so any risk--real or imaginary--is more acceptable.

The Alar crisis caused food fears to skyrocket. This was a scare that focused, not on a heavily processed product with an unpronounceable ingredient list, but on apples--a product from Mother Nature. Consumers felt deceived; they were no longer in control of their food; they had not chosen to take this risk. Even worse, the Alar scare focused on the most feared disease--cancer--and the most innocent and vulnerable victims--children. Science proved no match for the emotions this issue generated.

Even though Alar was not a pesticide, this chemical was used as a springboard to accelerate a panic over pesticides. It is particularly difficult for consumers to take a rational approach to risk assessment for pesticide use since there is no question that pesticides are potentially toxic chemicals.

Scientists try to convince the consumer that pesticides are safe by talking about negligible risk and statistical probability. But how many mothers are willing to accept the probability of one chance of harm in a million exposures after she sees a picture of this mother and her son who was born with no arms or legs, allegedly due to prenatal exposure to pesticide residues?

Although the caption on the photo clearly used the word "alleged," the food purchaser, who is primarily female and often a parent, will not pay attention to that stipulation. Nor will she ask about levels of exposure, or type of pesticide, or any other rational question. Emotions take over and she simply personalizes that mother's situation and internalizes it---thinking, what if that one in a million were my child?

Another problem is that many consumers question the benefits of

pesticides. In the Institute's 1990 survey, half the respondents thought that the use of pesticides decreases the quality of produce and 46 percent thought that pesticides increase the price of produce.

Yet despite consumers' concern with chemicals in the food supply, most experts say that microbiological contamination poses the greatest risk.

Consumers also recognize microbiological hazards as part of the clean food issue. Food poisoning was given as the top health-related food hazard in the latest Institute survey. "Spoilage and germs" was also the specific food safety concern most often mentioned in the Food Marketing Institute's 1990 Trends survey.

Consumers worry about food not being fresh, and not being handled properly. They worry about refrigerated cases in the supermarket not being cold enough, meat cases not being clean enough, and chicken being contaminated with salmonella.

However, consumer concern does not carry over to food safety in the home. Consumers might worry about refrigerated convenience foods not being stored properly in the supermarket, but they do not think twice about allowing foods to thaw overnight on the kitchen counter. They worry that the employee in the supermarket deli may not have washed his hands before slicing their cheese, but think nothing of using the same platter for both raw and cooked meat. In short, consumers are concerned about food-borne illness, but they are not willing to accept any blame themselves.

The risks of food poisoning are also more acceptable to consumers than some other risks because the effects of such food-borne illness tend to be more familiar and are usually reversible.

Consumer have to make decisions about what to buy and what to eat every day, yet they do not trust much of the information they receive about food safety issues. The public gets one message from activist groups, another from the government, and constantly changing warnings and reassurances from the media--so it's not surprising that consumers are confused and skeptical.

In Good Housekeeping's survey, the family doctor received the highest credibility rating when it came to food safety information, but few consumers actually received their information from this source. Family and friends, government, and consumer groups ranked together in the middle. Television was the top source of food safety information, but it ranked low on the credibility scale.



The food industry received the lowest confidence ranking by consumers. This is unfortunate since there is so much technical expertise in industry. Yet it is also understandable considering today's marketing climate and the food industry's tendency to play both sides of the fence. One group will spend millions on public relations and educational campaigns to convince consumers that food is safe, while another uses advertising campaigns that exploit and fuel consumer perceptions that food is unsafe in order to gain market share. Such a two-sided approach leads consumers to believe that the food industry has no ethics and is solely profit driven.

Consumer activist groups and the media certainly do their share of food terrorism as well, but consumers are more likely to recognize the profit motive of the food industry.

Whether or not consumers accept scientific solutions to food safety and environmental issues depends on their perceptions of the risks and the benefits of these solutions. But consumers perceive risks quite differently from scientists. To the consumer, manmade is equated with harmful while natural is perceived as harmless. Furthermore, harm in any amount is equated to harm in every amount.

These perceptions may prevent consumers from accepting the new technologies that may offer solutions to food safety issues as solutions and cause these technologies to be rejected as experimental, artificial and inherently risky?

We must find ways to help consumers demystify new technologies so that they can make sensible, informed decisions. If not, emotion-laden controversies such as we have seen over the use of food irradiation, will be repeated again and again.

Consumers are so confused, skeptical and angry that I doubt that any single group can restore consumer confidence in the food supply. We need innovative food safety programs in which experts in academia, in the food industry, in government, and consumer groups work together to help the consumer understand new technologies and put any risks into the proper perspective. Such programs must address not only scientific issues but also the subjective issues that scientists tend to ignore.

Only with open communication characterized by honesty, responsiveness and respect will consumers be able to make decisions based on facts not fears.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91, Session P4

Wednesday, November 29, 1990

## FOOD SAFETY AND THE ENVIRONMENT

Dr. Enrique J. Guardia  
Vice President Scientific Relations  
Kraft General Foods

Good morning.

I was asked here today to speak on behalf of Kraft General Foods, and the Food Industry, about our positions on Food Safety and the Environment...and I was told to cover these two complex and important topics in 15 minutes or less!

This reminds me of a brochure I once saw for a tour of Great Britain that said: You'll see the Tower of London, Buckingham Palace, Westminster Abbey, and Windsor Castle...then, in the afternoon! Well, that's kind of the way I feel right now.

Kraft General Foods markets more than 2,500 products in 140 countries. Our 94,000 employees work in some 450 locations around the globe, including 200 manufacturing plants.

Many of our brand names are household words such as Jell-O Gelatin, Maxwell House Coffee, Post Cereal, Kraft Cheese, Oscar Mayer Bologna, Philadelphia Cream Cheese, Sealtest Ice Cream, and the list goes on. Names you know, and I trust, you use.

I tell you this not only because my air time is free, but also to underline the fact that we have a great deal of interest in the topics being discussed here today.

Some years back, a Commissioner of the FDA ranked the importance of several factors under food safety. First; and most important, he ranked food-borne microbial problems. Last; and least important he ranked additives and pesticide residues.

Last week, I read comments made by a Mr. Ivan Guthbert Baptist, Executive Secretary of Case (Consumer Association of Singapore)

speaking at the First Asian Conference on Food Safety, held last September in Malaysia. He said, being critical of the food industry, "we know the biggest hazard of food is from microbiological causes, mainly bacteria."

- "The second largest food hazard is poor nutrition."
- "The third largest in food is environmental contamination - caused by industrial effluents."
- "The fourth group of food hazards are the toxicants that occur naturally in food, and last on the list are hazards from residues from pesticide residue in food and from food additives."

And one hour ago you heard Joann Smith, USDA, say the same thing.

Then and now, here and there this makes sense. My company, the Food Industry and most of the people in this room, I think, agree with that prioritization.

Thus, it causes me great concern that the perception of many people in this country and in this city, is that the biggest safety issue in our foods is pesticide residues, and to be clear, we think that is wrong. Oh I know there are people in this audience who disagree, and others are eager to talk about risk communication, hazard and outrage, etc. - that is terribly important. (It is in fact critical that we learn to effectively communicate relative risks), but I cordially remind them and us, that priorities must be based on real world concerns. If we allow environmental evangelists to set the agenda, we can actually hamper the prevention of food-borne contamination - certainly our number one safety objective.

Based on the above, we (my Company, the Food Industry) put a great deal of thought, effort and care into designing packages, processes and products, so that they set the gold standard for uncompromising wholesomeness and safety. This is not just a matter of ethics. It is just plain common sense. A franchise is a "crown jewel." It is simply too valuable an asset to risk.

Thus, we actively support advances in the prevention and detection of pathogens in foods. We support universities, institutes, as well as our own in-house microbiological research to detect and prevent food-borne contamination.

Kraft General Foods lead the formation of a microbiological committee under ILSI to sponsor research on Listeria that would shed light where it was lacking. Industry, and academia belong to it, and share knowledge to hopefully avoid the problems we "discovered" a few years ago.



We support the development and implementation of HAACP (and again you heard about this program earlier) - and we want to keep it focused on microbial prevention, and not diluted with issues of economic adulteration.

In terms of nutrition issues, referred to above (broadly) as part of "safety", we view our task as offering the consumer choices and enough information on which to base those choices. The consumer has always demanded product quality and convenience at an affordable cost. Although the issues of health and the environment recently have been added to that list of demands, the leading concerns remain, quality, convenience, taste and affordability.

Our policy is (simple, but fundamental) to offer a broad array of products that allow the consumer to pursue a balanced, varied and moderate diet of his or her own choosing. In addition to the regular versions of our products, Kraft General Foods offers a wide array of products that are reduced fat and fat-free; reduced cholesterol and cholesterol-free, high fiber, and low salt. And much more. We price them competitively and let the consumer decide between the Sealtest Free or cheesecake - or both clearly the emphasis is, and it needs to be, on diet, not single foods.

Which leads me to my next point. We can take care of quality, convenience, safety and cost at our end. What we want from the regulators is a set of rules that reinforces factual information in a consistent fashion. Not 50 different sets of rules in 50 states. Certainly not untested rules based on the "latest concerns." In fact, you heard Linda Fischer and Joann Smith tell you why this is becoming also true at the international level.

Our efficient national food production and distribution in the USA, the model for the world, is at risk if we atomized regulations. We also want maximum flexibility to meet dietary needs. If we want to reduce the caloric intake from fats and, you have said we do, we can best meet that by maximum product options representing various degrees of taste, reduction, and benefit considerations. Its not good policy to set the barrier so high through regulations so as to have only products that no one would buy, and discourage the development of technology that would improve them.

On the issue of state regulations an example that hit home recently at Kraft General Foods was the banning an aseptic package in the state of Maine. The primary function of a food package is to protect the product in it, and aseptic packaging - in wide use around the globe - does that efficiently. It protects the product; enables safe, non-refrigerated storage for a substantial time, it reduces energy and is portable.



Today, in Maine, these useful benefits are not available to consumers because Maine says the package is not recyclable. Never mind that it is compactible to a very small size, and it takes very little space in a landfill. We believe this is exactly the wrong way to encourage the development of responsible and responsive technology.

This does not mean that we in Kraft General Foods or the Food Industry are indifferent to environmental concerns. We all understand the need to find solutions to the problem of solid waste disposal. We believe the answer lies with the suggested EPA hierarchy. Source reduction, recycling, incineration, and yes, land fills where necessary. Not one of these approaches but all of them. Not one package material, but whatever is the best total option - for safety, quality the consumer and the environment.

We are increasing the use of recycling for glass, aluminum, and paper. We're learning more about the safety and quality issues involved in plastic recycling. And we're eliminating heavy metals and other barriers to incineration. Many light weighted materials are being tested to achieve reduction while maintaining strength and barrier properties.

When we look at the total picture we can see that we have made considerable progress in finding solutions to the solid-waste problem. And I have no doubt that we can and will continue to do that by setting reasonable goals and timetables, developing symbols and descriptors that communicate clearly, accurately, and uniformly across all markets.

However, we should not be asked to sacrifice product safety for landfills. We must focus on the safety, quality, taste, and affordability of the single package of, for example, an Oscar Mayer Lunchables, a Kraft Singles, or the Kool-Aid Kooler, even as we develop new and better packages, and the infrastructure to handle them.

We are being polarized with the consumerists demanding regulations that differ from state to state on the one hand. On the other, there is the industry that counters with its concern for food safety. Let's not be like that fellow who said: "my mind's made up, please don't confuse me with the facts." I believe we must find a way to listen and understand each other.

For example, on pesticides we need prioritization and focus. I say, lets work on the top list of the pesticides that are considered potentially harmful. Let's determine how much the American public ingests, how much if anything is harmful. In other words, let's do a valid scientific risk/benefit assessment and focus on real life numbers and issues and move off the extremes.

If we work together, I know we can tackle the complex issues of food safety and the environment without compromising either safety or the environment.

In closing, I'd like to share with you a personal observation. I have had the advantage of living and working in several European countries. I recall very well the oppressive presence of the Berlin Wall, and I shared by proxy the joy of the East Germans when that wall crumbled.

That revolution in Eastern Europe was and is about basic freedoms. The freedom to elect government representatives, the freedom to travel...and the freedom to make choices, even little choices - like food products.

So let us work together to set reasonable priorities. So that we can ensure that the "system" does not limit our personal freedom to continue to choose, and to preserve the best and most efficient food production and distribution system anywhere. It work so well, in fact, that "I sure don't want to tinker with it."

Thank you.

# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

United States Department of Agriculture  
Washington, D.C. 20250-3900



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**Outlook '91, Session P5**

**Thursday, November 29, 1990**

## **Concluding Remarks**

**Jack C. Parnell**  
**Deputy Secretary of Agriculture**

Thanks for the great introduction and for your warm welcome. It is indeed a special pleasure to share a few thoughts with you about "agriculture in a world of change." Anyone who knows me would tell you I'm a creative positive thinker and usually like to begin my remarks on a positive, upbeat and uplifting note. Not today.

Today I want to start off on a darker, more sinister, less pleasant subject, a subject that quite frankly disturbs and frightens me: herpetology. Now, before any of you in the audience look around to see if you are in the right conference room or begin squirming uncomfortably in your seats, whether from embarrassment or whatever reason, I should hasten to explain that herpetology is the study of reptiles.

The reptile I would like to talk about today is the snake: specifically, the boa constrictor. Now, some of you may have labored in the past under the impression that the boa constrictor drops out of a tree on its victims and quickly crushes them in the powerful folds of its body. That is not how it operates. On the contrary, extensive research on the part of my staff, which consisted of my secretary looking up "boa constrictor" in the Encyclopedia Americana, has revealed the true modus operandi of this dangerous reptile. Let me read it to you:

"Ordinarily the snake places two or three coils of its body around the chest of its prey. Then, each time the victim relaxes and exhales its breath the boa simply takes up the slack. After three or four breaths, there is no more slack. The prey quickly suffocates and is then swallowed by the boa."

My friends, this deadly phenomenon of a victim becoming an unwitting accomplice in its own destruction is not confined to the animal world. Virtually all of us whose livelihood, whose way of life, whose dreams depend on agriculture; all of us who know what it means to America to have an efficient, successful agricultural industry, have seen the boa constrictor in action.

The coils of the boa we are facing today and over the next decade are animated by a mesh of complex issues such as:

- o International competition for foreign markets, many times unfair, and the increasingly protectionist sentiments, particularly in the European Community.
- o Irrational concerns about a myriad of nonscientifically based environmental issues such as food safety, wetlands, water quality, and public and private land use issues.
- o Run away spending by government, leading to staggering budget deficits, which result in a general lack of confidence in the United States, not to mention high real interest rates.

Each coil of the snake is another breath gone.

A coil slips around agriculture as the public mistrusts the safest food supply in the world. Another coil slips around as we are needlessly forced from our farms by emotional, rather than scientific responses to environmental concerns. Another, as we lose foreign markets to unfair competition by our competitors, all accompanied by a chorus of groans and moans, heroic resolutions and populist rhetoric. Then apathy sets in; another coil slips around, and it gets strangely quiet.

Ladies and gentlemen, I've been looking forward to talking to you today because you, more than anyone, are closer to and better understand the nature of the challenges looming ahead of us. The issue boils down to you and me, and whether we can be successful in communicating to the American public and politicians the importance of a safe, efficient, affordable, productive and well financed agriculture. And whether we are up to the challenge of recognizing and embracing the changing world around us.

We must set goals that demand the best and execute them flawlessly. To try new things. To take action. To learn. And then try things again. We in agriculture must not let the boa constrictor take another coil!

A very recognizable coil of the snake, and the first point I'd like to make, is the intense competition American agriculture faces in this emerging era of the international marketplace. The high risk path for U.S. Agriculture in today's world is to do nothing. We must vigorously seek trade liberalization.

Past accomplishments to liberalize industrial trade demonstrate that the GATT process works. For example, tariffs on manufactured goods have been hammered down from 40% in the mid 60's to 4-6% percent now. During the same time, the nominal rate of protection on agricultural goods has risen from 21% to 40% over the same period.

A quick glimpse at the auto industry demonstrates how interdependent and interrelated our world has become. Ford Motor Company owns 25% of Mazda, which manufactures cars for Ford in the U.S. Ford and Mazda also own part of a Korean company which builds cars for export to the United States to be sold as Fords. In Latin



America, Volkswagen and Ford have merged into a single company, which exports trucks into the U.S. General Motors holds a 41.6% stake in Isuzu, which is starting a joint U.S. Venture with Subaru, which is partly owned by Nissan. GM also owns half of Daewoo Motors, a Korean company that makes Nissan cars for Japan, and Pontiacs for America. Chrysler owns 24% of Mitsubishi Motors and, through Mitsubishi, a share of Hyundai, the Korean car manufacturer. Mitsubishi has long made cars under Chrysler's label, and a joint-venture Chrysler-Mitsubishi plant in normal, illinois turns out cars under the Mitsubishi nameplate.

What does all this mean as we ponder the future for increasing the use of American agricultural products? It means we must look beyond our own national boundaries if we wish to be an integral part of the worldwide economic growth pattern that is now emerging. The sweeping globalization of business ownership, technical expertise and joint-venturing reaches far beyond any such restructuring ever before possible.

It links us all together as citizens of the world in new and positive ways. It requires changes in the way we think and approach potential business opportunities. Increased international trade and commerce is a win-win situation, but the winds of change are blowing, deep change that will jolt the unprepared. These are exciting times, the most exciting agriculture has ever known. A new world of global business opportunity awaits those who dare to reach for it. U.S. Agriculture must be a part of it. We have the capability of being the cornicopia of the world.

As you know , there is a great sense of urgency surrounding the successful completion of the Uruguay Round of talks. The 230 million people of the United States are not a sufficient market for this nation's agricultural abundance. Our market and the markets of all countries, developed and developing alike, should be the 5.2 billion people of the world. This round of talks is scheduled to conclude very shortly, and though we've made great strides in coming to terms on a number of industrial issues, we still have many key points to be resolved, most notably in the agricultural sector.

This round of talks is critical to the economic future of the world's nations. With more than 100 countries sitting down at the bargaining table, these are possibly the most important trade negotiations in history. The stakes are tremendous. If this round fails to produce meaningful reform, we will have severely limited the chances of our farmers, our agricultural industries, and our nations to grow and thrive in the next decade and into the next millennium. That would be tragic for every nation, and indeed, every person on earth.

Two-hundred and twenty-four years ago, two men, separated by an ocean, almost simultaneously wrote political-economic treatises that still shape global discussions today. One of these was Thomas Jefferson, author of our Declaration of Independence, which called for "life, liberty, and the pursuit of happiness." The other was Adam Smith and his equally-profound "The Wealth of Nations," which in effect became the blueprint for how a free and open economic system should work. "The Wealth of Nations" described the ability

of unhindered markets to grow and prosper to the general benefit and welfare of a nation's people, with only an "invisible hand", market forces, to guide them. From this marriage of the world's two great ideas grew the strongest, wealthiest, most powerful nation in the world: the United States of America.

Today, even though the economic-political stage has shifted from what was primarily a domestic orientation in Smith and Jefferson's day to a global one in ours, the principles remain the same. In their respective domestic arenas, those nations that followed Smith's model have clearly won the day. Who, then, will carry the day in the international arena?

The total cost of these trade-distorting agricultural policies to taxpayers and consumers in industrialized nations has now topped \$250 billion a year. Developing countries, who need cash flow to help their economies grow so that they can become full partners in the world economic community, lose as much as \$26 billion in income each year due to lower world prices and being excluded from markets.

No nation is an island. We all are inextricably tied together. What hurts one nation usually also hurts its trading partners.

We are now looking at the final moments in the negotiations. With seconds on the clock it's fourth down and 25 yards to go.

If the Europeans can't come to the GATT negotiating table in good faith, and discuss concrete reductions in agricultural subsidies and the real, measurable lowering of tariff walls, then they are making the initial unfriendly moves of a subsidy war. There is little doubt that the United States will retaliate, using every tool available to us, in order to maintain our market share.

This coil of the boa constrictor is already tightening even as we speak. Eastern Europe has been liberalized and we've all rejoiced. But suppose the rest of Europe seduces these countries into joining its common agricultural policy? Then we'd have East Germany, Poland, Hungary, Czechoslovakia, Bulgaria, and Romania all joining in. Can you imagine an 18-member common agricultural policy? American farmers have many good reasons to support a GATT agreement, not the least of which is holding onto their own financial prosperity.

Working together, we must press for a mutually beneficial resolution of these complex issues.

The next coil of the boa constrictor that is affecting all of us now and will profoundly affect our future is our Congress' insatiable appetite to spend. In 1983 the Federal Government's income stream was \$600.3 billion and in 1990 \$1 trillion 46 billion, a 70+ %

increase. Our problem is not that we don't have enough income, our problem is that no matter what our income is we spend more.

Which leads me to the Farm Bill. As you know, the Reconciliation Bill anticipates a cut in USDA spending of \$13.6 billion over the next 5 years. Some will see that as negative and that is understandable; cuts are always difficult but there are some bright spots.

If we can substantively bring spending under control and install some discipline in the budget process, demonstrating to the world that we can and will be responsible fiscal managers, the U.S. can regain the mantle of the 1980's as the country leading the world revolution in economic growth. I am told that for every reduction of 1% in interest rates, it saves the American farmer about 750 million dollars in farm income.

In general, the new Farm Bill fundamentally builds on the success and international competitiveness of the 1985 bill: continuing that market-oriented approach through aggressive export assistance programs, increased research efforts, and added production flexibility.

This new planting flexibility is part of a "triple base" program starting in 1991 and is designed to give our farmers an increased say in the way their farm is run and in planting and business decisions. It is essentially a way for our farmers to participate in government programs, while allowing them the leeway on a portion of their base acreage to plant a variety of other crops - for the market and for additional income. It is also sound environmental policy.

The last coil of the boa, which is as equally challenging and perplexing as the first two, is how to deal with environmental concerns.

First, I believe everyone by now must realize that environmentalism is mainstream. President Bush has an environmental agenda. Business publications trumpet the emergence of corporate environmentalism. Contributions to environmental groups are surging, and close to half of Americans call themselves environmentalists. It was once said, there is nothing more powerful than an idea whose time has come, and clearly the time has come for the idea of environmentalism.

But as this idea becomes part of mainstream America, it is bringing change, disquieting change. Change which is forcing a basic reassessment of all we take for granted.

In spite of the remarkable progress which has been made in the past two decades, agriculture continues to experience the pain of its tarnished reputation and credibility, as its ratings in opinion polls sag while environmental concerns rise dramatically.

We could shrug these low approval ratings off, except that they will inevitably lead



to stricter and less efficient regulations at all levels of government, here and across the planet. The global economy is a reality and so is global concern about the environment. Our ability to maintain the freedom to operate could be at serious risk.

As the public's concerns about the environment grow, should we wait until we get a more bureaucratic, "one size fits all" maze of regulations? Or should we do the right thing, and unleash the creativity of agriculture to address those concerns before the stifling regulations are put into place?

The answer is obvious. I believe agriculture can, and will, work to ensure a more environmentally friendly world, yet one that meets the essential needs of a growing population. We need to challenge those who seek to tear down and destroy, by quoting half-truths and pseudo science, the most productive economic engine in the world today, American agriculture.

What we must understand is that in the doing, our critics not only destroy agriculture, but they destroy the way of life we have all come to expect and enjoy in this country. Agriculture is to a large degree what makes the american way of life possible.

Americans spend less than 12 percent of their disposable income for food. Allowing the great bulk of our income to be used for other purposes. Agriculture is the unique renewable portion of our economy that creates new wealth. In agriculture you plant a seed; let it grow; clip it off; and then do it all over again next year. Agriculture takes "nothing" and makes "something" out of it. It creates new wealth, and continues to do so year after year -- and we have left all that we started with.

William Jennings Bryan said it best a century ago: "Burn down your cities and leave the farms alone, and your cities will spring up again if by magic. But allow our farms to be destroyed and there will be grass growing on every city street across America."

Agriculture is truly one of America's greatest success stories. I call it the greatest story never told. We may not be perfect, but we're not finished yet!

Fortunately in this country we have gone well beyond the point of mere survival. A few grains of rice, or a loaf of bread, is not the overriding concern. The main concern is now, and will continue to be our standard of living, the quality of our lives. It is in this arena that all of us in this room will be tested in the years to come. Our test is going to be:

- o How well we maintain the balance;
- o How well we live within our resource base; and
- o How well we provide the resources needed to fuel an advanced, sophisticated, technical society, without destroying our basic wealth: the land, water and soil.



Now that may seem philosophical and esoteric, but I believe it to be true, a hard reality.

Wendell Wilkie once said: "Our way of living in America is a strong but delicate fabric; it has many threads. It has been woven over many centuries by the patience and sacrifice of countless liberty-loving men and women."

"It serves as a cloak of protection of poor and rich, of black and white, of Jew and gentile, of foreign and native born. Let us not tear it asunder. For no one knows, once it is destroyed, where or when mankind will find its protective warmth again."

The decisions that will be made in the next 10 years to balance this very fragile equation, between the environment and our standard of living, will depend in large part on how well you and I equip ourselves to deal with the new and exciting challenges that lie before us.

I heard a speech a number of years ago. It was entitled "The Environment, Here Today, Gone Tomorrow." The same might be said of agriculture. Today I see the error of that statement. Whether speaking of the environment or of agriculture, it won't be that simple. We won't see it go.

It won't end with a bang or explosion, but with a soul piercing whimper. It won't be something as glorious as being carried away by a huge golden eagle, eaten by a grizzly bear, or swallowed whole by a great white shark. It will be more like being pecked to death by starlings, or nibbled to death by bluegills.

We'll lose a farm here, a ranch there. A grove of trees here, and a pothole there. We'll needlessly lose the tools of farming that modern technology has given us. And little by little we will give up the fight, give up on agriculture as we know it, full of the memories and stories of abundance that our grandchildren can listen to and wonder about, but never experience. Unless, of course, we truly become partners to ensure that we become a society whose resource decisions match its people's dreams.

I told you earlier that my remarks would be on "Agriculture In a World of Change." The reality is that we have come, as poet Robert Frost once said as he discussed his life, to a fork in the road, "two roads diverged in a wood. I took the one less traveled, and that has made all the difference."

I pray that God will give us the courage to take the less travelled path and to look squarely at the changes that are shaping our industry; as we set the course for our future and the future of generations to come, and never again revert to failed policies of the past by asking government to do what we can do better for ourselves. The choice is clearly ours!!!

Twas battered and scarred and the auctioneer thought it barely worth his while to spend much time with the old violin, but he held it up with a smile.

What am I bid good folks -- he cried.

Who'll start the bidding for me? One dollar - who'll make it two? Two dollars -- who'll make it three? Three dollars once, three dollars twice, going for three -- but no!

When from the back of the room came a grey-haired man - and picked up the bow, he wiped the dust from the old violin and tightened its old loose strings --

And played a melody pure and sweet as a caroling angel sings the music ceased and the auctioneer in a voice that was quiet and low said what am I bid for the old violin -- and he held it up with the bow.

One thousand dollars and who'll make it two

Two thousand dollars and who'll make it three

Three thousand, once, three thousand twice, going and gone said he

the people cheered - but some of them cried - we do not understand what changed its value --

Swift came the reply -- the touch of the master's hand.

Many a man with life out of tune -- battered and scared with sin -- is auctioned cheap by the thoughtless crowd, much like the old violin.

A mess of pottage -- a glass on wine -- a game and he travels on

He's going once, going twice, going almost gone

Then the master comes and the foolish crowd can never quite understand --

The worth of a soul and the change that's wrought by the touch of a masters hand.

Ladies and gentlemen, in the challenging years that lie ahead, agriculture's values and needs may be auctioned very cheap, by that thoughtless crowd.

Unless you and I are dedicated to provide the touch of the master's hand.

# **ANNUAL AGRICULTURAL OUTLOOK CONFERENCE**

United States Department of Agriculture  
Washington, D.C. 20250-3900



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Outlook '91, Session P5

Thursday, November 29, 1990

## **The Current Energy Situation and the National Energy Strategy**

**W. Henson Moore**  
**Deputy Secretary, U.S. Department of Energy**

Thank you ... I'm pleased to have the opportunity to visit with you today, to discuss the current situation in the Middle East and its impact on energy, and also to tell you something about the national energy strategy we are developing. It is a comprehensive, quality effort to analyze our nation's energy needs and options for the short, medium, and long-term ...

Let me begin with the Middle East. Just a year ago we were all celebrating the collapse of communism and the dawning of a new era of political and economic freedom. We were seeing democracy break out across Eastern Europe and the Soviet Union begin to open up. You remember what was going on just a year ago. The President calls it the emergence of "a new world order."

Unfortunately, we didn't have much time to enjoy that victory -- a victory, incidentally, based on a half century of commitment and perseverance by the United States and its allies. We didn't have much time to enjoy that

victory because, on August 2, Iraq invaded Kuwait. Since then, we've had a new set of problems to deal with.

I think President Bush is handling the international situation masterfully. He has gotten no less than ten resolutions passed in the United Nations with broad support. Even today, the U.N. is voting on an eleventh resolution which we expect to pass readily. We have over two dozen countries allied with American military forces in the Persian Gulf to defend the peninsula and restore Kuwait to its rightful people.

I'm here this morning to talk specifically about what's happened in energy as a result of Iraq's aggression. I'm happy to report to you that, basically, the news is good. Shortly after the invasion, an embargo was placed on the oil coming out of Iraq and Kuwait, and the world lost 4.3 million barrels of oil a day. That's the biggest interruption we've ever had. But we all got to work, the President and those of us in the Department of Energy and others, calling every country in the world that produced oil and asking them to produce more. And they did, including the United States. So now, in the month of November, we have more than made up for that 4.3 million barrel a day loss. We estimate replacement production at 4.5 million barrels a day, meaning we're producing about 200,000 barrels a day more now, worldwide, than we were before the invasion.

We also asked consumers, worldwide, to do their part and conserve. And they responded. In the United States right now, total consumption of crude oil and products is down about 5 percent over this same time period last year.



With more production and less consumption, we have seen oil supply and demand come back into balance and the world market stabilize. There should not be any serious or long-term shortages of crude or products.

As for prices, they are up, but not because of market fundamentals. If a barrel of oil were selling for what it's really worth, it'd be selling in the low to mid-twenty dollar range, not \$30 per barrel as today, or \$40 where it peaked last month.

The reason the price is up is fear -- what we call the "war premium." People are apprehensive about future supplies. Consequently, they bid up the price of current supplies. As traders become less fearful of the future, as they realize supplies will be available in any eventuality, they will stop paying the "war premium" and prices will come down. We have already seen the drop from \$40 a barrel down to about \$30, where it seems to be hovering now. I don't think we'll fully eliminate the war premium until the Middle East situation is resolved.

We just issued a report from the Department of Energy, from our Energy Information Administration, analyzing the path of oil prices since August 2. In the past, we've done a great job of studying something after it's over and telling you about it a year later, when you've lost all interest. This time, we pushed. "Let's get a report out now, right in the middle of this thing, telling the American people exactly what's happened and what's been going on."

That report was issued last week, and it's a good report. Basically, it shows that the retail price of gasoline in the United States did not go up as fast or as high as the price of crude oil. As a matter of fact, the price of gasoline in Europe and Japan went up about twice as high as here. Diesel fuel, of particular interest to the farm community, rose in line with crude.

The one area where we did experience steep price increases was kerojet -- aviation fuel. It rose above crude because demand is very high and supply tight. First, military operations increased demand substantially. Second, supply shrunk when one of the largest refineries in the world producing kerojet, in Kuwait, shut down because of the invasion. Third, the Japanese and other people in the Pacific Rim use kerosene as a heating fuel in winter, further increasing demand. So, the combination of increased demand and reduced supplies drove the price of aviation fuel higher than crude.

We're trying to get this supply and price information out to the public. At this point, from all the information we have, we see no evidence of any price gouging. As I said before, the price of gasoline has gone up less than the price of crude; diesel fuel and heating oil prices have tracked the price of crude. Even aviation fuel responded in a normal market manner to an initial imbalance in supply and demand. Over the next months, we expect prices in all fuel markets to ease.

Now, let's consider the outlook for the next several months, through the winter, primarily. Overall, supplies of both crude and products should be adequate.

Crude stocks are higher this year than last, by about 1.5 percent. Gasoline stocks are slightly lower than at this time last year, by about 2.7 percent, but within the normal range. Distillate stocks -- diesel fuel and heating oil -- are up about 11.5 percent over last year and pose no problems. Propane looks more problematic.

If you remember last winter, December was a particularly cold month. People who used propane experienced spot shortages. Right now, stocks are just barely above last year's levels, and still below historic levels. So what I'm saying is, if we have a prolonged winter, or a severe cold snap as we did last December, there could be temporary spot shortages of propane. But so far, the weather has been moderate, and propane stocks continue to build -- which auger well for the winter.

Another area of concern, which we're watching closely, is worldwide refining capacity. The margin is thin. We lost the big refinery in Kuwait, and we're not buying anything coming out of Iraq. So refineries worldwide are operating close to capacity to compensate for these losses. The system has no flexibility to adjust. Should there be a large explosion, for example, or other serious problem, you could wind up, perhaps, with some temporary spot shortages of refined products. But as we stand here this morning, that's not the case. Refineries are running smoothly, and stocks generally are building.

Well, what about the longer-term picture? What are we going to do when this is over? Are we going to return to the same kind of energy complacency

as before? Or are we finally going to learn something, after almost two decades of interruptions, and make some changes?

In July of last year, long before the current crisis, President Bush contacted the Department of Energy and gave us a specific directive, in writing, to develop a national energy strategy that would prevent this country from being too dependent on insecure sources of foreign oil.

So, within the Department of Energy and through a comprehensive interagency process, we've been working for some 16 months to develop a national energy strategy. In our minds, the strategy is a national game plan for insuring that the American people will have all the energy they need at affordable prices from more secure supply sources, and that we will produce, process, and use this energy in ways that do not harm our environment.

The national energy strategy will provide a framework and establish parameters for a broad national debate about real solutions to real problems. We can say to the American people and the Congress, "Here's your problem, and here are a number of solutions to it. Now, here's the one the President has picked. [And let me say, parenthetically, he'll be doing that next month.] If you don't like the solution he picked, then here are the remaining choices with their pro's and con's. Which one will you pick?"

We've spent a lot of time, some 18 hearings across the country, 400 witnesses from 46 states, 2000 submissions of written testimony. We've been meeting privately with every identifiable interest group, to go over the



options we've developed and refined through the interagency process. The Department of Agriculture has been part of that process, a very important part, as I'll explain in just a few minutes.

We've come up with every need and every possible solution we can think of in the field of energy, from electricity to diesel fuel, gasoline, alternative fuels, and hydro-electric power -- and that's not even a tiny fraction of the list. You name it, and we've addressed it. And we've come up now with about 65 potential solutions to America's energy needs and problems.

Some of these possible solutions -- we call them "options" -- are contradictory. Some are very far-reaching. Some are fairly conservative. All will have an impact. We've done the analysis; we know the costs and benefits of the various options. And government-wide, we have now agreed that this is a comprehensive and complete set of options. We do not know which ones the President will pick; we don't fully agree on which ones he should pick. But we do agree that this is the complete set of possible options, and honest analysis of what each will and won't do.

We've gone through a thorough interagency process. We had another interagency meeting yesterday, and the Department of Agriculture was there. The Economic Policy Council was called, where most of the Cabinet sits. It was the second meeting for most, reviewing this draft strategy. There will be one more Economic Policy Council meeting, and then we'll meet with the President in December. He will make final decisions -- pick which of these options he will hold out to the American people as being the collective answer

to our energy problems.

Then you will see not only the ones he picked, but also the ones he didn't. You will be able to decide whether you think President Bush selected the right options -- or whether others should be included, or eliminated. Right now, every possible option is on the table, from mandating alternative fuels to giving tax credits for various types of energy development, to providing incentives for conservation.

At this point, we certainly don't have all the answers, but we do know this: if nothing is done, oil imports are likely to become an increasing problem. As part of the strategy process, we developed an energy baseline out to the year 2030, to tell us what's the United States will look like in the future, in terms of domestic energy production and consumption. Today, oil accounts for 40 percent of our total energy consumption. By the year 2030, if we don't do anything -- if present laws and regulations stay the same, R&D programs stay the same, and if we have no energy strategy -- then oil consumption will decline slightly, from 40 percent to 36 percent over the next 40 years, but the level of oil imports will rise from about 50 percent this year to 80 percent in 2030. In other words, left unchecked, our level of vulnerability grows very large indeed.

What I'm telling you is that we're not going to eliminate oil from the U.S. economy, but we can begin to reduce our vulnerability through consistent, well focused efforts to diversify our energy sources and suppliers. In one important effort to diversify energy sources, we've been working very closely

with the Department of Agriculture to develop non-food crops and improved conversion technology to make alcohol fuels an economically competitive alternative to gasoline.

DOE has negotiated a memorandum of understanding with the Department of Agriculture -- a contract between our two departments outlining how we're going to cooperate in alternative fuels R&D. We have programmed additional money in the Department of Energy, and I'm sure the Department of Agriculture is doing its part as well. As a matter of fact, in the current fiscal year, DOE has increased its funding for alternative fuels research by 107 percent, from \$23 million to \$47 million, and we have a five-year plan in place to support continued R&D.

Basically, the goal of our initiative with USDA is to develop a fast growing, high fiber, non-food crop together with more efficient conversion technology to improve the economics of grain to alcohol production. In these efforts, we've got two primary challenges.

One is to find a new high-cellulose crop that can be grown very quickly, a crop whose only use will be as a feedstock for alcohol fuels. The second challenge is to develop more efficient technology to convert that new crop into alcohol.

We've been working on this second problem for some years, and making progress. We've already brought the price of ethanol from corn, for instance,

down from \$5 a gallon in 1980 to \$2 a gallon today. But that's not good enough. We must still subsidize alcohol fuel. Our goal is to produce and market alcohol fuel at a price equivalent to gasoline at \$1.15 a gallon at the retail pump. This would make it fully competitive with gasoline in the commercial marketplace.

USDA estimates that about 150 million acres of land are available today to grow such a new crop. It would provide a new cash crop for farmers in America, and a boost to the U.S. agricultural economy. In addition, it would give the nation, for the first time, a secure new source of transportation fuels -- a fuel source we would grow right here in America rather than import from uncertain suppliers.

We also believe that the environmental benefits of using alcohol are large, in terms of both reducing current auto emissions levels and closing the carbon dioxide cycle. You don't close the loop with gasoline, but you do when you grow a crop. The crop burns, emits carbon dioxide, which is then absorbed back into the next crop. So alcohol fuels can also improve our ecology.

We're estimating now that in the year 2030 we could produce up to 50 percent of our transportation fuel with this new crop. And that's our goal, 50 percent.



Let me wrap up by simply saying: The country's been without a clear, focused energy strategy for too long, and those of us in DOE know it. This President knows it. We now have a national energy strategy that his entire Administration has been working on, that's going to be decided by him in December. It's going to include many options, such as the one I've just described. We think that, collectively, these options will form the core of a national energy strategy that will answer the questions: What energy sources are we going to have in the year 2030? What are they going to cost us? Are they going to be secure? Will they be good or bad for our environment?

But we're going to need your help. For example, if we really get into this new crop we're talking about, you're going to have to follow our research on behalf of the agricultural industry.

I think it's a very exciting possibility, something I'm very pleased about -- and this from a fellow who comes from an oil-and-gas state. But I don't see competition. I see a lot of farmers in Louisiana being able to make a living for the first time in a long time. We're not putting oil people out of work -- we'll need the oil for chemicals and plastics and all the other petroleum-based products we depend on.

So, I don't see competition. I don't see problems. I see economic growth. I see energy security. Above all, I see opportunity. I see a strong and prosperous future for America.

Thank you very much.

# ANNUAL AGRICULTURAL OUTLOOK CONFERENCE

United States Department of Agriculture  
Washington, D.C. 20250-3900



Outlook '91, Session P5

Thursday, November 29, 1990

## Energy Issues for Agriculture: Challenges for Research

Charles E. Hess  
Assistant Secretary, Science and Education  
U.S. Department of Agriculture

Our discussion today could not come at a more appropriate time. Turmoil in the Persian Gulf is threatening a major portion of the world's oil supply. The President's new Clean Air Act will force us to provide the Nation with cleaner burning fuels. There is growing public and scientific concern about global climate change.

In facing these realities, research -- and particularly agricultural research -- has a tremendous role to play. This is consistent with the belief -- from ancient civilizations to our current technologically advanced society -- that new scientific and technological knowledge can be a tremendous instrument of national strength and public good.

Agricultural research has the well-deserved reputation of giving a high return on each investment dollar. It has also helped to create America's strong agricultural industry -- supplying the United States and the world with a bounteous, safe, nutritious, varied, and reliable food and fiber supply. For example, the average U.S. consumer spends an incredibly low 11.8 percent of his/her disposable income on food.

Not content with this monumental accomplishment, we are now asking agriculture and agricultural research to help us respond to our energy realities.

### Global Change

In terms of global change, agriculture has three important roles to play, and research is part of all of them. In the first place, agriculture contributes to the accumulation of greenhouse gases through the production of methane from ruminant livestock and flooded field rice production, and of nitrous oxide, a byproduct of nitrogen fertilization. Research on more efficient fertilization practices would help reduce this gas byproduct, as well as decrease potential groundwater contamination.

Methane emissions are of particular interest as a greenhouse gas because methane is 20 times more effective in trapping radiation from the sun than is CO<sub>2</sub>. But methane's half-life in the atmosphere is about seven years, compared with CO<sub>2</sub>'s half-life of 100 years. So if you can reduce methane emissions, you can have a relatively large impact in a relatively short time.

The three largest sources of methane are ruminant animals, nonagricultural wetlands, and flooded rice fields. Ruminants contribute, on a global basis, an estimated 80 million metric tons per year, or about 16 percent of the total methane emissions. Nonagricultural wetlands contribute approximately 115 million metric tons (23 percent) and flooded rice fields 110 million metric tons (22 percent). Corking cows, as some have suggested, is not the answer to methane emissions. However, genetically modifying the microorganisms in the ruminant may make it possible to redirect the energy used in methane production into greater production efficiency.

The second role for agriculture is to prepare itself to adapt if there is climate change. We can do that through the development of stress-resistant plants -- adding traits such as drought tolerance and temperature tolerance to crops.

Third, is the very positive role agriculture can play in mitigating the impact of climate changes by sequestering carbon dioxide through the process of photosynthesis. In addition, trees and other plants can be a source of biomass for alternative fuels and for carbon-based chemical feedstocks used in the industry -- recycling CO<sub>2</sub>, as well as replacing fossil fuels, the use of which simply adds more CO<sub>2</sub> to the environment. For years USDA has been part of ongoing interest in using agricultural commodities as a source of energy.

### Ethanol

In the old days, alchemists sought to make their fortunes by turning lead to gold. Today, our modern scientists are working on turning corn to petroleum -- or something even better -- ethanol.

This is not a new issue for agricultural research. After the 1973-1974 Arab oil embargo, USDA established a major initiative in alcohol fuels and conducted more than \$40 million of R&D on ethanol fuels. We have made significant progress in more effective fermentation and dewatering processes and improved feedstock varieties.

In the mid-1980s, with plentiful supplies of fuel at declining prices, ethanol research funds were redirected to other activities. Annual funding dropped to less than \$1 million for ethanol. Today, it remains at a similar level.

Given the new concern over air pollution and global change, plus the renewed concern for dependency upon foreign fuel sources, there is now renewed emphasis on the use of ethanol and other biomass fuels instead of fossil fuels.

The Department of Agriculture is very much interested in the ethanol industry. One of Secretary Yeutter's goals is to work to eliminate the need for idling land by increasing demand for crops that have a commercial market. About 95 percent of the ethanol produced in the United States is made from corn (some 330 to 340 million bushels), although it can be made from any feedstock containing starch or fermentable sugar. This is the output from 2,750,000 acres and represents about 4 percent of this year's expected crop.

Ethanol has some important advantages. In terms of energy usage, it increases gasoline octane ratings, reduces carbon monoxide emissions, and reduces dependence on petroleum. More broadly, it benefits corn producers; raises net farm income; contributes to rural employment; and reduces agricultural program costs.

In contrast, another proposed fuel that has received a lot of attention, methanol, has an important disadvantage -- it is made from natural gas, a non-renewable natural resource; and we would continue to be dependent for our supply on other nations such as the USSR, Saudi Arabia, Argentina, Mexico, and other Pacific Rim nations.

With current technology, ethanol cannot be produced inexpensively enough to compete with gasoline without subsidies. However, its air quality and other benefits may warrant continued subsidization until lower costs and higher oil prices enable ethanol to compete on its own.

The competitiveness of ethanol is not based simply on the price of corn or of petroleum. A major determinant is the cost of the technology and processes involved in its creation. The challenge to USDA is how to improve the economics of ethanol production and use.



We need research to find better ways of removing the water from the ethanol. Currently, it is a zero sum game, with the energy expenditure for this dewatering equalling the energy gain. There is a tremendous amount of work going on to solve this problem with membrane filtration. In addition, we are especially proud of USDA-funded work by Michael Ladisch at Purdue on the use of a corn grits absorber. I'm told that this one piece of equipment saves about four cents per gallon in ethanol production costs.

Another possible step forward uses the modern tool of biotechnology to put genes into a single organism to make it capable of fermenting both cellulose and starch (the principal components of corn). This enhanced efficiency will allow us to use more of the corn's raw material and increase production from 2 1/2 to 3 1/2 gallons, making a big economic difference. Results like these which reduce costs, increase efficiency, and save energy really make research dollars count.

### ETBE

A recent development, Ethyl Tertiary Butyl Ether (ETBE), made from ethanol, also offers considerable promise. It has all of the desirable features of ethanol blends (high octane and low carbon monoxide pollution) but none of its undesirable technical properties such as intolerance of water (normally present in fuel systems) and high fuel volatility. ETBE can be handled like any petroleum product and will be more readily accepted by oil and automobile companies, and by consumers.

ETBE reduces both carbon monoxide pollution and ozone levels. ETBE needs further research and testing before entering commercial production, but it appears that its improved properties can help ethanol make a significant contribution to cleaning up air pollution.

The Clean Air Act will require oxygenated fuels in areas which do not meet carbon monoxide and ozone clear air standards. This will certainly increase the demand for ethanol and ETBE blended fuels in these areas.

Furthermore, I might point out that Secretary Yeutter recently directed all USDA employees to purchase and use fuels containing ethanol or ETBE in USDA-owned or leased highway vehicles when such fuels are available at prices comparable with regular unleaded gasoline. This action affects some 33,000 vehicles.

### Alternative Chemical Feedstocks

Agricultural research is not putting all its eggs in one basket however. We are doing a great deal of work on alternatives to the use of petroleum as a chemical feedstock. USDA's Agricultural Research Service runs the Northern Regional Research Center in Peoria, Illinois, recently renamed in the 1990 Farm Bill as the National Center for Agricultural Utilization Research, where scientists have done incredible work finding additional uses for the starch in corn.

For example, starch can be use to replace the carbon black in tires. Not only does this decrease reliance on carbon-based chemicals, but removing the black opens up new vistas for tires. Who's going to want to settle for ordinary white walls, when fuchsia, or vermillion, or gentian colors are available on designer tires?

Starch has a history of being used as a paper additive, but at one point many manufacturers began to move to petrochemicals. ARS research improved starch's performance -- saving a market for farm products, and saving paper companies from what would now seem a costly switchover in terms of energy



costs. Starch is also a contributor to environmental enhancement because using 50 to 70 percent starch in plastics makes them biodegradable.

### Biomass

Other renewable energy forms from biomass are highly viable, with the potential for providing 30 percent of total energy needs. Sources encompass much of the plant kingdom – whole trees, seeds, fruits, and the residues or byproducts of various extraction and food-processing operations. One of the major benefits of using renewable biomass is that carbon is recycled in a short time period and no additional carbon is released. Conversely, the use of coal and petrochemicals reintroduces previously stored fossil carbon and contributes to the "greenhouse effect."

Research is improving the technology of working with the cellulose, starch, and sugar of plants. Studies are being conducted on methods to convert them into fuels through direct combustion, gasification, liquefaction, and biotechnology.

### Vegetable Oils

In addition to research on alcohol fuels, substantial progress has been made in the development of vegetable oils as fuel petrochemicals. The oils of such crops as rape, crambe, sunflower, safflower, soybeans, and peanuts can be used for heating and as an extender or an alternative to diesel fuel. Some of them can produce 100 to 200 gallons per acres of diesel fuel equivalent. Farm use of diesel is 3.4 billion gallons per year -- which could be provided by 15 to 30 million acres of vegetable oil crops.

While the energy content is only slightly lower than that of diesel fuel, oils are not currently competitive with diesel fuel without a subsidy. Therefore, additional research is needed to improve varieties for greater yield and better oil production, reduce the oil viscosity, and improve conversion processes. Other research includes providing markets for byproducts and residues.

### Energy Use

Before I close, I want to focus your attention briefly on the other side of the equation. Not only is agriculture involved in creating new sources of energy, but it is working to create greater efficiency in the use of sources we already have.

The National Research Initiative which is part of the 1990 Farm Bill provides a healthy shot in the arm for agricultural research. One of the many research areas it will support is plant gene mapping. When we have a clearer understanding of basic plant functions and the genes that control them, we will be better able to use the science of biotechnology to advance agriculture.

Using biotechnology to develop pesticide- and disease-resistant plants means greater efficiency in the use of pesticides. The saving here is two-fold as many pesticides are created from petrochemicals and better managed usage will have less impact on the environment as a whole.

The use of nitrogen fertilizers is an important part of U.S. agriculture, yet their production is extremely energy intensive. Again, using our plant breeding capabilities can help us develop crops that use nitrogen more efficiently, thus reducing the need for repeated applications.

Computers can help save energy as well. Research-developed decision support systems (such as GOSSYM-COMAX in the cotton industry) can monitor conditions and consider options, thus helping producers apply the right amount of a chemical at the right time and thus minimize its use and reduce the number of fuel-consuming trips across a field.

Technology has also created sensors which can analyze the nitrogen content of the soil without disturbing the crop -- or monitor the chlorophyll in a plant (an indicator for the amount of nitrogen present). Again, this data helps the producer make judicious and informed decisions on chemical use.

### Conclusion

Scientific exploration has been justified on its intrinsic cultural and intellectual value alone. However, the resources devoted by governments and industries to scientific research also find their rationale in the more pragmatic grounds of national economic and political security.

The current interest in several major policy issues -- clean air, budget deficit, surplus commodities, global change, and energy supplies -- present a timely challenge to assess the future role of renewable energy. Agricultural research has been -- and will continue to be -- an important part of that progress.

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## 67th ANNUAL OUTLOOK CONFERENCE

United States Department of Agriculture  
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### TUESDAY SESSIONS

- ☐ 90USDA-1 Rural Development & Credit Outlook, *Walter Hill, Peter Meyers, La Verne Ausman & C.G. Kelly* Holthus
- ☐ 90USDA-2 Nutrition: Dietary Guidelines, Consumer Knowledge & Food Consumption, *Gerald Combs, Betty Peterkin, Linda Cleveland & Howard Riddick*
- ☐ 90USDA-3 Impact of Soviet Transportation System on U.S. Farm Exports, *Michael Karl, Paul Scott & Terry Williams*
- ☐ 90USDA-4 Secretary's Keynote Address: Agriculture in a World of Change, *Clayton Yeutter*; Foreign Policy Briefing: *Lawrence Eagleberger*
- ☐ 90USDA-5 Overview of 1991 Outlook, *Sidney Jones, James Donald & R.E. Anderson, Jr.*
- ☐ 90USDA-6A&B Panel: Trade and Economic Prospects in a Crucible of Change, *Condoleezza Rice & Richard Rahn* (2 tape set)

### WEDNESDAY SESSIONS

- ☐ 90USDA-7 Outlook for Food Grains, *Edward Allen, Sara Schwartz, Paul McAuliffe & Brian Fisher*

- ☐ 90USDA-8 Outlook for Feed Grains, *Philip Sronce, Larry Van Meir, Jack Kintzle & Bruce Randy Weber*
- ☐ 90USDA-9 Outlook for Dairy Products, *Sara Short, James Fraher & Larry Hamm*
- ☐ 90USDA-10 Outlook for Cotton, *Scott Sanford, Carolyn Whitton, Kevin McDermott & Terry Townsend*
- ☐ 90USDA-11 Food: Prices, Health Concerns and Labeling, *Ralph Parlett, Jr., Carol Kramer & Donna Porter*
- ☐ 90USDA-12 Family Economics: Families with Children, *Edith Neal, Mark Lino & Mary Ann Guadagno*
- ☐ 90USDA-13 Outlook for Tobacco, *Verner Grise, Annette Clauson & Will Snell*
- ☐ 90USDA-14 Outlook for Forest Products, *Robert Phelps, Richard Birdsey & Clark Row*
- ☐ 90USDA-15 Outlook for Aquaculture, *David Harvey, Hugh Warren & R. Oneal Smitherman*
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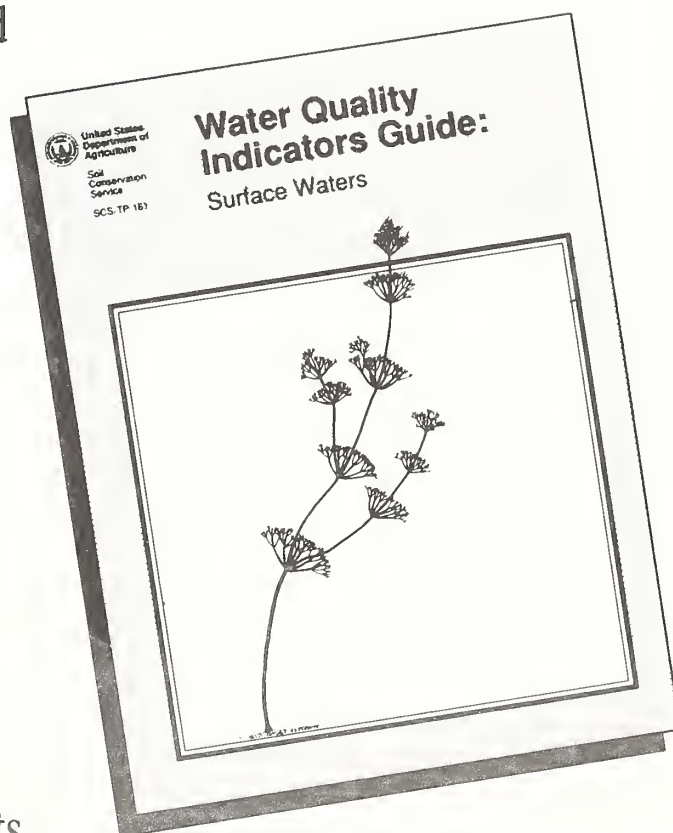
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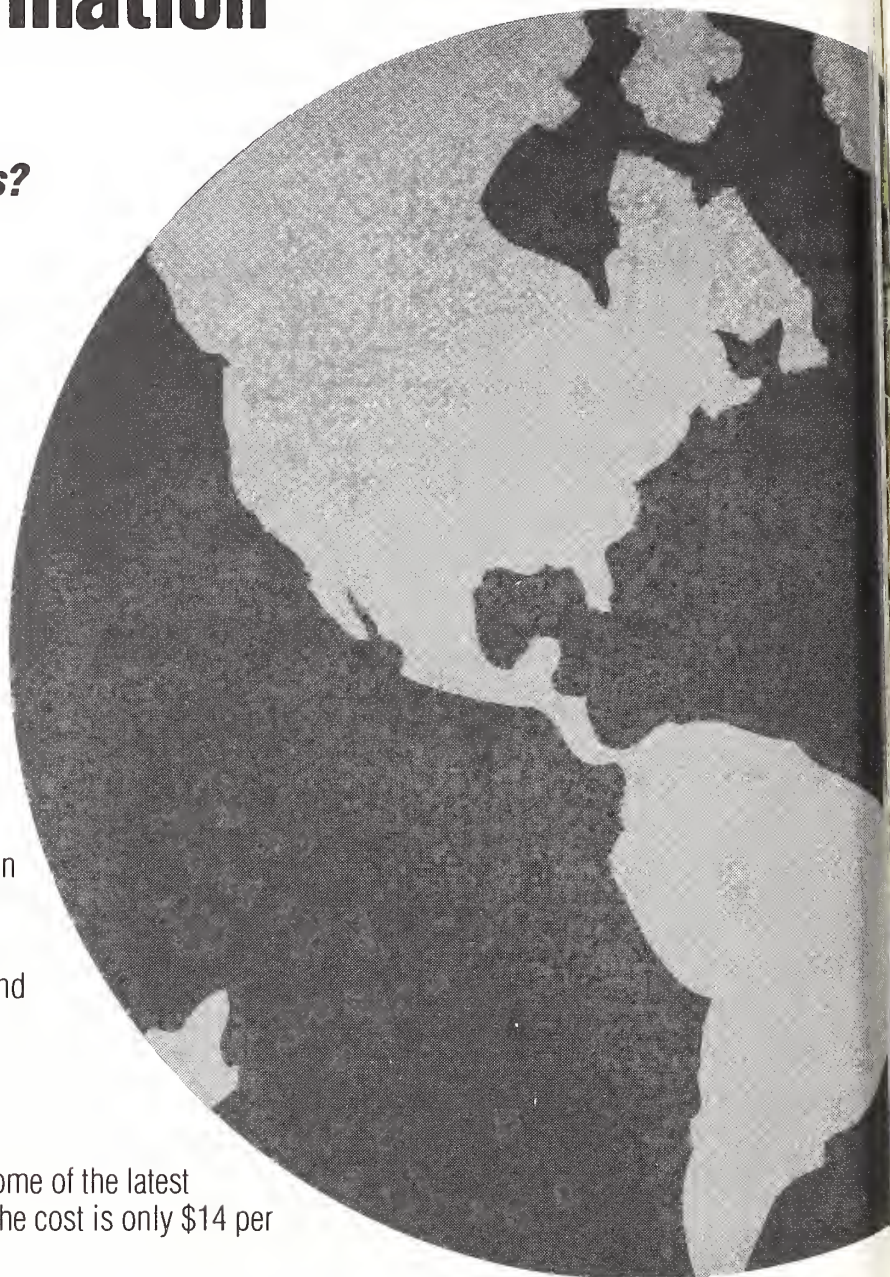
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